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The Veterinary Journal.

FEBRUARY, 1929.

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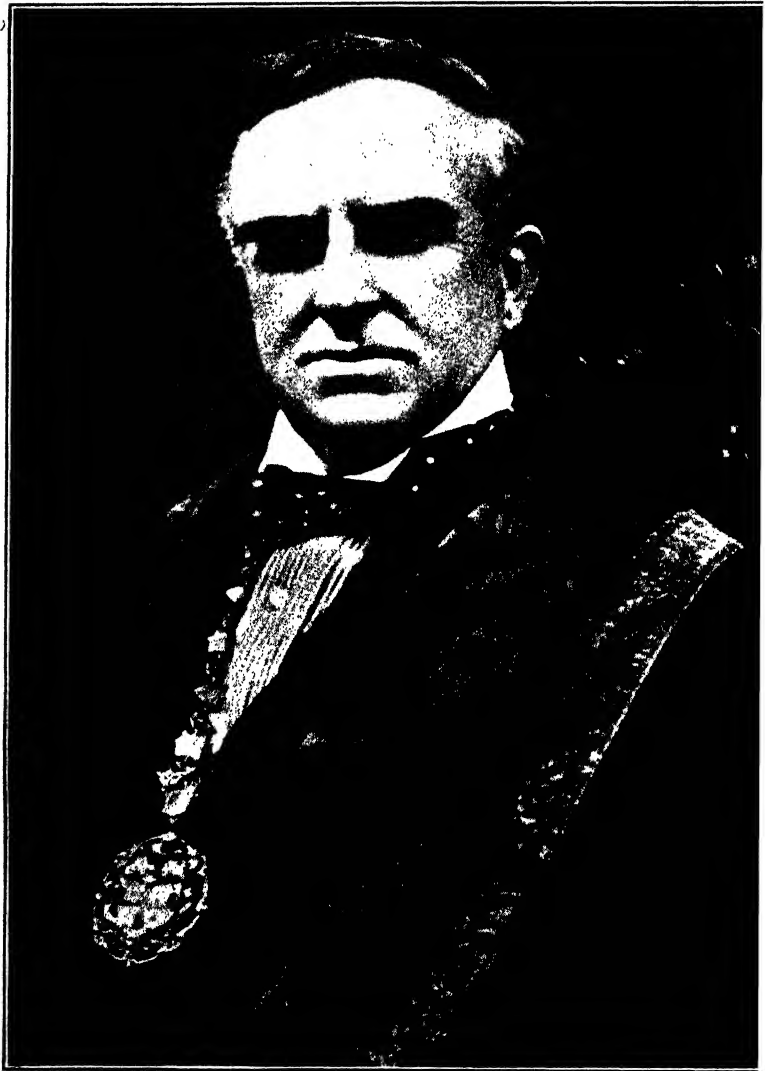
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Sub-Editor :

GLADSTONE MAYALL, M.R.C.V.S.

JANUARY, 1929.

Biography

Professor John Share-Jones, D.V.Sc., F.R.C.V.S.

DR. SHARE-JONES was born at Cefn in North Wales and educated at King's College, University College (North Wales), of which he is now a Governor, and the Royal Veterinary College, London. From the latter he graduated as M.R.C.V.S. in 1900, being appointed Tutor in the Department of Surgery and afterwards Demonstrator of Anatomy. From this post he transferred to the Liverpool University Veterinary School, being appointed to the Professorship of Veterinary Anatomy, and eventually becoming Director of Veterinary Studies.

His other University activities include Examinerships to the Universities of London, Edinburgh, and Aberdeen for the respective degrees of M.B., B.Sc. (Science and also Agriculture) and the D.V.H., so that his career has been an eminently scholarly one; whilst his numerous contributions to the literary world include an illustrated Surgical Veterinary Anatomy (four volumes), chapters on Veterinary Science in the "Encyclopædia Britannica," and many articles too numerous to mention on Animal Husbandry and Agricultural education.

The two latter subjects have been an especial study of Professor Share-Jones and his poignant speeches on these subjects at political and other meetings have attracted much attention in the daily Press.

For a long time the members of the veterinary profession have felt the need of direct representation in the House of Commons, and at the present moment there seems a reasonable prospect that this hope may be fulfilled, for Professor Share-Jones has been adopted as the Liberal candidate for the Oswestry Division of Shropshire, a seat rendered vacant by the retirement of the Rt. Hon. O. C. Bridgeman. At the present moment, what with the presidential duties and political efforts, it requires no great amount of imagination to be aware that he is a very busy man; and in his efforts to enter Parliament Dr. Share-Jones may rest assured that he has not only the eyes of the whole profession upon him, but that he also carries with him their best wishes for the successful attainment of the task which he has undertaken on their behalf.

THE VETERINARY JOURNAL

Editorial

AN IMPERIAL RESEARCH INTO ANIMAL DISEASES.

ABOUT a year ago a very important Imperial Agricultural Research Conference was held in London, being attended not only by Agricultural Scientists, but by Veterinary Heads of Government Departments from all over the world.

As the sequel to this it is proposed to establish eight new Bureaux, or Clearing Houses of information, attached to existing research institutes, and the governing committees of these have expressed their approval of the scheme.

The subjects which it is proposed to bring forward, together with the several places of study, and their respective directors, are :—

Soil Science, Rothamsted Experimental Station, Harpenden, Herts (Sir John Russell).

Animal Nutrition, Rowett Institute, Bucksburn, Aberdeen (Dr. J. B. Orr).

Animal Health, Veterinary Research Laboratory; Weybridge (Dr. W. H. Andrews).

Animal Genetics, Animal Breeding Research Department, Edinburgh University (Professor R. A. Crew).

Agricultural Parasitology, Institute of Agricultural Parasitology, near St. Albans (Professor R. T. Leiper).

Plant Genetics (for crops other than herbage plants), Plant Breeding Institute, Cambridge (Professor Sir Rowland Biffen).

Plant Genetics (for herbage plants), Welsh Plant Breeding Station, Aberystwyth (Professor R. G. Stapleton).

Fruit Production, East Malling Research Station, Kent (Mr. R. G. Hatton).

An Agricultural and Veterinary Research of this kind cannot fail to do good work, and we commend it to the attention of our intending graduates as an interesting professional outlet with a prospective future not only financially, but in the world of science and original opportunity.

General Articles

AN EMPIRE VETERINARY SERVICE.

By LT.-COLONEL H. A. REID, O.B.E., F.R.C.V.S., D.V.H., F.R.S.E.

A CLOSER union of the British Empire is an ideal toward which we are steadily progressing, and it is not merely a federation of states, but a federation of hearts to which we must aspire. We must learn to think in terms of that vast and widely distributed population related by ties of kinship and mutual interests, and our policy must be one which shall serve these people, and lead ultimately to the development of a self-supporting dominion whose unlimited resources shall provide opportunities for all who dwell within its territories.

Anything, therefore, which may assist us in this aim should claim the attention not only of the avowed protagonists of the British Empire movement, but of every British subject. With this object in view we should strive to encourage greater co-operative effort and a better co-ordination in the work of the various services throughout the Empire. With a suitable organisation much of the energy at present expended in wandering through paths which have already been thoroughly explored might better be conserved.

Without detracting from the value of independent inquiry, especially when local conditions have to be taken into account, it would seem an advantage to those engaged upon a common task to have at their disposal the experience derived from the painstaking labours of others similarly occupied elsewhere.

Up to the present this need has been partially met by reference to reports and contributions published in the many scientific journals, or by correspondence with contemporary workers in various parts of the world. To anyone who has undertaken scientific investigation in the more remote portions of the Empire the inadequacy of the assistance obtainable through these channels will be appreciated. Too often the investigator will sooner or later find that at the cost of much time and money, he has been traversing a furrow which has already been turned. In the interests of those concerned, and particularly on the grounds of greater efficiency and economy, a scheme for co-ordinating the work of our widely scattered forces should be devised.

At the present time International Research as applied to the study of foot-and-mouth disease has been discussed, and at the second meeting of the Committee of the International Office of Epizootics,

held at Paris in May last, the following resolution was moved by the representatives of France and Germany :—

“ That the Committee of the International Office of Epizootics should encourage frequent intercourse and exchange of opinions between scientists, especially those engaged in various countries in the study of foot-and-mouth disease, which would be of advantage to them in their researches. That interested governments should support these relations and that they should even consider the possibility of the international exchange of research workers, and, finally, that the International Office of Epizootics, as soon as provision could be made, should contribute, if necessary, to this object.”

It is evident that such collaboration, through the pooling of individual experiences, might lead to important results. Treated from an international standpoint difficulties might arise. But it is quite practicable to contemplate a corresponding arrangement applicable to research workers throughout the British Empire having as their aim the interests of the Empire as a whole.

The valuable information resulting from observations carried out by veterinary staffs in the field does not perhaps receive sufficient recognition. The laboratory worker himself should avoid cultivating a too academic attitude of mind. He should at least have had considerable experience of the practical difficulties which have to be overcome. There is perhaps a tendency on the part of the one to confine his attentions to the microscope and test tube, and on the other to act merely as a reporter and collector of pathological material. Both require to observe a sympathetic relationship.

How can our graduates best be trained to render their services of value to the Empire? There can be little doubt that the curriculum provided at our veterinary schools now stands in need of revision if not reconstruction. It is not sufficiently comprehensive for modern requirements.

Whether it will be necessary to extend the diploma course to five years in order to effect the changes which appear to be necessary is admittedly a controversial question.

On reference to the calendar of the Ontario Veterinary College we find included in a four years' course such subjects as Bio-chemistry, Animal Husbandry, Civics and Economics, Public Speaking and Journalism. The importance of some of the subjects mentioned may be open to criticism. Though the field of education can never be too wide, the difficulty of covering further ground without sacrificing fundamentals has always to be borne in mind. The student's receptive ability is governed by his mentality and powers of application. It

does, however, appear important that some of these subjects should, if possible, be introduced into a revised curriculum. Bio-chemistry, for example, in the light of recent advances seems to be a subject upon which veterinary students should receive further instruction. Animal Husbandry, which should include the study of genetics, is also an essential part of their education.

We would prefer some title more appropriate than "Journalism." Our graduates do not necessarily require to have the proficiency of professional writers, but it is very desirable that they may be able to describe clearly and concisely the conditions they are called upon to observe. Many would undoubtedly benefit by training in this respect.

It may be assumed that in selecting a profession the question of future prospects and emoluments must considerably influence one's choice. Anyone entering our ranks will reflect whether it is worth devoting the time and money necessary for a return which in relation to other careers may resemble a pittance.

Unfortunately, this is the position in which the veterinary profession finds itself to-day, and from which it can only be rescued by each in his particular sphere endeavouring to provide convincing testimony of the economic importance of the services he is rendering. Probably no better opportunity of gaining public support in this direction has ever existed than that which at present obtains. For this we have chiefly to thank our research workers and administrators throughout the Empire.

In a paper on Veterinary Education by Colonel G. K. Walker, presented recently at the Annual Congress of the National Veterinary Medical Association, we find, in reference to the curriculum for the diploma of the Royal College of Veterinary Surgeons, the following remarks:—

"Dissatisfaction with the present course is not heard so much regarding the theoretical knowledge possessed by recently qualified persons as in respect to their technique and their acquaintance with animal management."

Few, probably, will incline to differ from Colonel Walker in this matter. How, therefore, can these defects be rectified? Only by a revision of the methods at present in vogue and a refusal on our part to be harnessed to the forces of reaction.

A veterinary surgeon should be essentially what the term implies. But is the teaching of regional anatomy and the practice and demonstration of surgery on the various species of domesticated animals adequate? Are facilities for teaching practical operative surgery available in all our colleges? Anyone who has visited the great

continental veterinary schools must have been struck with the amount of attention devoted to dissection and particularly the anatomical study of those regions with which the operative surgeon should be specially familiar.

Then in regard to Animal Management. How can that be taught on a practical scale in veterinary schools situated in cities where the whole atmosphere is foreign to the subject?

Veterinary students require to have free access to livestock kept under ordinary farm conditions. They require to cultivate that knowledge which will enable them to discriminate between what is normal and what is abnormal in animal life. They should be capable of meeting the stock farmer on his own ground to discuss with him matters of common interest, and they will find, thanks to the influence of agricultural college education and popular scientific literature, that many farmers are remarkably well informed. How few young graduates appreciate the importance of possessing a practical knowledge of this subject which later they have to acquire by experience, sometimes at the cost of a humiliating exhibition of their own ignorance.

Even in such simple routine tasks as the collection and preservation of pathological specimens for subsequent laboratory diagnosis, the making of a blood smear, or the furnishing of indispensable data, there is sometimes displayed a want of aptitude inconsistent with the attainments one expects to find among professional men. Does it arise from want of training or from disregard of it?

Our conception of an Empire Veterinary Service should of necessity include the practice of a free interchange of workers. Study leave is essential for those engaged in research, and it is also to be recommended for others who show evidence of special ability. As a reward for good services rendered this privilege would be highly prized. According to where his further studies might be most profitably pursued, the officer selected should be allowed to proceed to any part of the Empire.

To avoid any tendency to occupy the time allotted in a perfunctory manner, work while on study leave should be controlled and a report dealing with it furnished to the responsible director.

Some direct return is expected for the privilege accorded, and it is therefore important to select only those who possess a sense of responsibility and who will take full advantage of the opportunities afforded.

Ministers in charge and heads of departments should support the claims of professional men in these respects. Instead of obstacles regarding salary, subsistence allowance, and passage money being raised, encouragement should be given the promising officer to engage

in post-graduate training ; it being borne in mind that the true source of economy is efficiency.

It is also highly desirable to promote and encourage interest in professional work by holding meetings and conferences and providing means of access to current literature.

It happens at times that young graduates are sent to remote districts where they have no opportunity of meeting their colleagues and exchanging views upon subjects of mutual interest. Under these circumstances there is always a danger of the knowledge which they have acquired during their long course of study becoming gradually dissipated. Everything in fact should be done to fan the youthful flames of enthusiasm which, under unfavourable conditions, so quickly die down.

State veterinarians should recognise that their labours are in no sense parochial, and are not confined to the country which, for the time being they happen to serve, but that they can by organised effort assist in no small measure to weld together that veritable League of Nations—the British Empire.

THE TRANSFERENCE OF IMMUNITY FROM EWE TO LAMB.

By T. DALLING, J. H. MASON and W. S. GORDON.

DURING the course of our researches into lamb dysentery we devised a method of protecting lambs from dysentery by the inoculation of the mother sheep with a toxin-antitoxin mixture, prepared from the toxin of an anærobe isolated from lesions in naturally infected lambs. Field results bear out that lambs are protected by such a method ; thus in 1926, 2·34 per cent. of lambs born from inoculated ewes died of lamb dysentery, while 18·44 per cent. of lambs from uninoculated ewes died. The figures for 1927 are 0·87 per cent. of lambs from inoculated ewes died, while 8·04 per cent. of lambs from uninoculated ewes developed lamb dysentery.

We have carried out a series of experiments which show that the inoculation of ewes with the above mixture causes the formation of antitoxin in their serum and that lambs born from such sheep have a similar amount of antitoxin.

Method of Testing Serum for the Presence of Antitoxin.

A standard toxin was made by growing the anærobe in meat broth for 12–15 hours, filtering through paper pulp and sand and then through a Berkefeld filter. The filtrate is precipitated with ammonium sulphate, the precipitate is dried *in vacuo* and the residue is finely powdered. A weighed amount of this powdered toxin is

dissolved in saline solution when tests are to be carried out. The toxin in this powdered form has retained its toxic and other qualities for many months. Experiments were carried out to determine the minimum lethal dose of the toxin by the mouse intravenous method, and the minimum skin-reacting dose by the guinea-pig intradermic methods. The smallest amount of toxin causing the deaths of mice and causing skin reactions in guinea-pigs, was used in the testing of the antitoxic content of the sheep sera. Fatal or reacting doses or multiples of them are mixed with 0.2 c.c. of serum, the mixtures allowed to stand at room temperature for about one hour and then injected into mice intravenously or into guinea-pigs intradermically; results are read in the mouse experiments in 24 hours and in the guinea-pig tests 48 hours later.

Testing of Serum from Inoculated Sheep.

Tests of many samples of serum from inoculated sheep have been made. Table I is the result of tests carried out on samples from 10 sheep which were brought to the laboratory for inoculating and testing. These sheep were injected twice during pregnancy, and were bled before injecting after the first inoculation and on several occasions after lambing. No antitoxin could be demonstrated in any sample obtained before injecting, while in three sheep after one injection, 0.2 c.c. serum protected against one fatal dose of toxin. Of the 10 sheep 3 failed to develop any detectable antitoxin after the second injection. Sheep 41 is of interest in that it showed the presence of antitoxin after one but not after two injections. On the day it received its first injection it was necessary to administer 40 c.c. hyper-immune serum. Our test, therefore, detected passive immunity.

TABLE I. ANTITOXIN IN SERUM OF INJECTED SHEEP.

Sheep.	Before injection.	After first injection.	After second injection (in days).
40	...	Nil	7 P. 3 24 P. 3 34 P. 3
41	...	Nil	17 nil 24 nil 44 nil
42	...	Nil	17 P. 2 24 P. 1 44 P. 1
43	...	Nil	3 P. 2 21 P. 3 32 nil
44	...	Nil	14 nil 21 nil 33 nil
45	...	Nil	17 P. 3 24 P. 1 44 nil
46	...	Nil	14 nil 21 nil 44 nil
47	...	Nil	23 P. 2 28 P. 2 54 nil
48	...	Nil	25 P. 1 32 nil 50 nil
49	...	Nil	16 nil 24 nil 44 nil

Tests done in mice i.v. 0.2 c.c. serum mixed with one or more M.L.Ds. toxin, and stood for about one hour before injecting.

Nil = No protection.

7 P. 3, etc. = protection against 3 M.L.Ds. toxin when test done with serum got seven days after second injection, etc.

Testing of Lamb's Serum for Antitoxin and a Comparison with Antitoxin Content of the Mother Sheep.

Again, many samples of lamb's serum have been tested for antitoxin content. Table II is the result of testing samples of serum from lambs produced by the ewes referred to in Table I. Samples of blood were drawn on the day of the lamb's birth and again when the lamb was 7-9 days old. The results of the test indicate that the antitoxin content of the lamb's serum corresponded closely to that of the mother sheep.

Our experiments do not indicate whether such antitoxin was developed by the foetus *in utero* or whether it was transmitted to the foetus *in utero* by the mother or via the colostrum after birth.

Experiments will be carried out during this year's lambing season to establish this point.

TABLE II.—COMPARISON MOTHER EWE AND LAMB SERUM—PRESENCE OF ANTITOXIN.

No	ewe and lambs.	Lamb serum (day of birth).	Lamb serum (7-9 days old).	Ewe serum (day of birth of lambs).
41	...	Nil	—	Nil
	—	(a)	...	
42	...	(b) P. 3	...	P. 2
	—	(c) P. 3	...	
43	...	(a) Nil	—	P. 2
	—	(b) Nil	—	
44	...	(a) Nil	—	Nil
	—	(b) Nil	—	
45	...	(a) P. 3	—	P. 3
	—	(b) P. 3	P. 3	
46	...	(a) Nil	Nil	Nil
	—	(b) Nil	Nil	
47	...	(a) Nil	P. 2	P. 2
	—	(b) Nil	P. 2	
48	...	P. 2	P. 2	P. 1

Tests done in mice i. v. 0.2 c.c. serum mixed with one or more M.L.Ds. toxin and stood for about one hour before injecting.

Nil = No protection—all mice died.

P. 3, etc. = protected mice against 3 M.L.Ds. toxin, etc.

A POSSIBLE MEANS OF SELECTION FOR NON-DEFORMITY BREEDING IN DEXTER CATTLE.

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THE appearance of deformed ("bull-dog") calves still is the most serious problem for the breeder of pure-bred Dexter cattle.

Recent investigations by Crew demonstrated convincingly that this malformation is identical with a human malformation, well known to medical students as achondroplasia or chondrodystrophy. In both the human and the bovine embryo the gross appearance of the skeleton, as well as the intimate changes in cartilage, and bone formation are of a very similar nature. A malformation of the same type in chicken embryos was recently studied by the writer. However, in spite of our knowledge of many of the details of expression of this malformation in different animals, no satisfactory evidence so far has come forward to explain the mechanism responsible for the irregular course of development of these embryos. Much attention has been paid to the glands of internal secretion as possible factors in the origin of the monsters. As a result of this work several of these glands (thyroid, thymus, parathyroids) have been ruled out as a probable seat of the causative agencies. There still remains suspicion concerning the pituitary gland, although, in view of our knowledge of the consequences of irregularities in the function of the pituitary, it appears doubtful whether this organ is fundamentally concerned with the appearance of the malformation. Further work must be done in order to determine the physiological source of chondrodystrophy. The solution of this problem may or may not be a tool for avoiding the occurrence of bull-dog calves. Until then, however, the breeders of Dexter cattle must rely on other means to obtain normal stock.

Selection is the only other way open to the breeder in his endeavour to get a herd of non-deformity breeding cows. If it were feasible to select a strain of pure breeding Dexters which do not produce malformed calves, even an effort consuming much labour and time would promise high rewards. At this point, however, a number of questions arise: Is the formation of the bull-dog calves due to inheritance at all? Are these malformations an intrinsic character of the Dexter breed as such, or is there any reason to believe that exhibition Dexter cattle may be bred which bear only normal calves? Is it possible, in other words, to rid the Dexter breed of the evil of producing deformities without altering the typical features of the standard bred animal?

All authors who have concerned themselves with the problem of the transmission of the factors causing the appearance of monstrous calves are agreed upon the conclusion that we are dealing here with an inherited trait (Seligmann, Wilson, Crew, Mohr, Wriedt). With regard to the mode of inheritance, however, diverging views have been developed. Wilson concluded from his own and from Seligmann's material that the production of bull-dog calves is dependant upon one genetic factor only, and that this factor is identical with the one responsible for the short-legged condition of the Dexters. According

to this interpretation the dominant trait of short-leggedness must be kept in a hybrid state in order to avoid deformities which are the result of a genetically pure condition of this character. Mohr has adopted this view when he says: "In this case (the deformities of the Dexters) we know, then, when a dominant factor with typical recessive lethal action was chosen for a standard character of a breed." According to Crew's work, however, the situation is much more complicated. He assumes one main factor (S), responsible for short-leggedness, and two additional factors (L_1 and L_2) about which he says that they "are modifying amplifying factors and their action is additive. Either alone produces a greater degree of the 'achondroplasia' characterisation, and together they yield the highest grade which is seen in the non-viable 'bull-dog' calf. The 'lethal' constitution is $SS + L_1 + L_2$." Crew, furthermore, suggests that the factors L_1 and L_2 are linked with S. The exhibition type Dexters according to Crew are homozygous for the short-legged condition (S), and for one of the two modifying factors (L_1 or L_2). If animals with different modifying factors are bred together a certain percentage of the offspring will receive the factor S and both modifiers. These combinations result in the appearance of deformed calves. If, then, in a herd all animals carry only L_1 or only L_2 in addition to S, no deformities will occur in this herd. On the basis of this assumption Crew has worked out the necessary steps to eradicate the production of bull-dog calves. This, of course, can be done only by the progeny test.

Any method which would make it possible to recognise directly whether an animal carries one or the other of the modifying factors would greatly facilitate the work of selection, and would save much of the breeder's time and money. If we could tag, so to speak, one of these modifiers, we might eliminate these animals from a breeding herd and retain in it only exhibition type animals which do not carry this factor. The possibility of such a method has been suggested to the writer by recent findings in co-operation with Miss Lorna W. Thigpen. After we had found striking abnormalities in the composition of the blood of chondrodystrophic chicken embryos, we studied the blood of Dexter cattle. An English and an American herd of pure-bred Dexters (the latter to our knowledge the only one in the U.S.) were examined for this purpose. By counts of the white blood cells in blood smears we determined the relative number of the different types of leucocytes and lymphocytes. In both instances we found that one cell type, the so-called eosinophiles, were greatly increased in number in these Dexters as compared with animals of other breeds. These cells have their origin in the marrow of the long bones of the

extremities, the part of the skeleton which in the bull-dog calves is affected to the highest degree. They are easily distinguishable by appropriate staining methods. Very little is known concerning the function of these cells, but we do know that they respond to various abnormal conditions with a relative increase in number, whereas under other influences they become less numerous. Under normal conditions the average of these cells in the blood of adult cattle amounts to about 5 per cent. of all the white blood cells. In the English Dexter herd which we examined, the average of eosinophiles for eight cows was increased to 13.9 per cent., and in the American herd nine cows had an average of 9.69 per cent. of these cells. The bull in the American herd exhibited an equally striking increase in the number of eosinophiles (12.33 per cent.), whereas the two bulls of the English herd appeared to be normal as far as the condition of the blood is concerned. No selection of any kind had taken place in the American herd, whereas the English bulls with a normal blood picture both came from lines selected for non-deformity breeding. Since both these latter animals are show bulls with many awards (one of them was second, the other third at the Royal show), they must carry the factor for short-leggedness (S) and one of the modifying factors (L_1 or L_2) provided Crew's factorial interpretation is correct. Yet the findings in the blood suggest that they must differ from the other animals, and it seems likely that this difference was produced by the selection for non-deformity breeding.

Two explanations of this situation seem possible at present. Accepting Crew's hypothesis of the inheritance of chondrodystrophy in cattle, we might assume that one or the other of the modifying factors affects the constitution of the blood. This explanation seems improbable because in this case all the animals in the American herd would appear to carry this modifier since their blood is abnormal and then should not produce monstrosities. Actually, however, they do produce the monstrous calves. The second explanation involves the assumption that one of the modifiers is recessive with regard to its effect on the skeleton, and is carried in a hybrid condition by all the Dexters unless it was eliminated by selection. Let us assume that this is L_2 in Crew's terminology. Then, all exhibition type animals must be heterozygous for L_1 , and in addition may or may not carry L_2 . In matings with L_2 coming from both parents and L_1 from at least one of them, bull-dog calves will be produced. In a heterozygous condition, however, the L_2 modifier will cause an increase in eosinophiles, thus revealing its presence.

At present it is impossible to offer a satisfactory explanation both on account of the inadequacy of our knowledge concerning the

inheritance of the deformities and the effect of selection upon the appearance of deformities and upon the constitution of the blood. The fact that bull-dog calves sporadically appear in long-legged breeds (as reported for instance, in a Holstein-Jersey cross by Downs), and cases like one known to the writer in which a Dexter which never had given a bull-dog calf when bred to a Dexter bull produced a deformity the first time when she was crossed to a Shorthorn bull, throw some doubt upon the reliability and completeness of our knowledge concerning the inheritance of the malformation. Since chondrodystrophy in chicken embryos seems to arise from a disturbance of the composition of the egg or of the physiology of the embryo rather than upon a genetic background (Dunn), it might be said, of course, that the sporadic appearance of bull-dog calves in other breeds than the Dexter has a similar origin. In any event, the situation demands further analysis.

Since we know, however, that the production of deformities in general is an inherited trait of the Dexter breed, and since our own observations have established that unselected pure-bred Dexters show a striking deviation from the normal composition of the blood, whereas two show bulls selected for non-deformity breeding had a normal blood count, it appears justified to suspect that these facts have a common physiological cause. Only experience with a larger amount of material can establish the nature of this association and the standards for and possibilities of a practical application in the work of selection. It will be impossible to do this work without the initiative and co-operation of the breeders of Dexter cattle.

REFERENCES.

- Crew, F. A. E.: "The Significance of an Achondroplasia-like Condition met with in Cattle," *Proc. R. Soc., B*, Vol. XCV, 1923.
- Downs, W. G., jr.: "An American 'Dexter Monster,'" *Anatomical Record*, Vol. XXXVII, 1928.
- Dunn, L. C.: "The Occurrence of Chondrodystrophy in Chick Embryos, II," *Archiv für Entwicklungsmechanik*, Vol. CX, 1927.
- Landauer, W.: "Untersuchungen über Chondrodystrophie I," *Ibid*, Vol. CX, 1927.
- Landauer, W., and Lorna W. Thigpen: "Studies in Chondrodystrophy. IV, Differential Blood Counts of Chondrodystrophic Chicken Embryos and of Dexter Cattle," *Ibid*.
- Mohr, O. L.: "Über Letalfaktoren, mit Berücksichtigung ihres Verhaltens bei Haustieren und beim Menschen," *Zeitschrift für induktive Abstammungs- und Vererbungslehre*, Vol.
- Seligmann, C. G.: "Congenital Cretinism in Calves," *Transact. Path. Soc. London*, Vol. LV, 1904.
- Wilson, J.: *Proc. R. Dublin Soc.*, Vol. XII, 1912.
- Wriedt, Chr.: "Letale Faktoren," *Zeitschrift für Tierzüchtung und Züchtungsbiologie*, Vol. III, 1925.

THE TUBO-UTERINE JUNCTION IN VARIOUS ANIMALS.*

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Johns Hopkins University).*

Introduction.

IN 1925 two short preliminary notes were published to call attention to the morphology and the possible physiological function of the anatomical structures at the uterine opening of the Fallopian tube. At that time it was noticed that it was sometimes easy to force India ink from the uterus into the tube, while at other times the wall of the uterus would rupture before any injection mass would enter the tube. In a search for an explanation, a routine histological study was made of the region marking the junction of tube and uterus in the ordinary laboratory mammals, and as indicated previously, special structures were found which might help to explain the varying patency of this region. Accordingly, the purpose of this article is to set forth in more detail the anatomy of the uterine ostium of the Fallopian tube in those animals whose organs are commonly studied in the laboratory.

Material and Method.

Unless otherwise specified all the material was obtained from laboratory animals that were killed with ether. The material was fixed as quickly as possible after the uterine injection. In several instances it was felt that a distended uterine cornu, when injected with a fixing fluid, and later fixed in the same fluid, would give a better idea of the anatomical structures, particularly with a view to showing their relationship when subjected to pressure, than would the ordinary non-injected uterus. For instance, it was learned incidentally that the mucosa of the pig's uterus would frequently be in such folds that in such an injected and distended uterus a fold might extend almost completely across the lumen.

GUINEA-PIG. The material was obtained from a small young female guinea-pig weighing 270 grams. The animal was not pregnant, and it was not until a pressure of 30 mm. of mercury was reached in the injection of the uterine cavity that any ink entered the Fallopian tube. However, even with this pressure only a small amount entered the tube, as was evidenced by traces of this injection mass at the ampulla, as well as by the examination of sections of the Fallopian tube which showed only a small amount of ink within the lumen of this structure (*cf.* Fig. 1). The tube joined the uterus almost at the

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very apex of the cornu (*b*, Fig. 1). Examination of the uterus showed that its musculature was arranged essentially in the fashion of a closely wound spiral. The entire block of tissue, containing the terminal portion of the cornu of the uterus, with tube and ovary was fixed in Bouin's fluid, sectioned serially in celloidin, and stained with Van Gieson and iron hematoxylin stains.

Microscopic examination showed that the junction of tube and uterus was characterised by a slight elevation within the uterine cavity (Fig. 2). This elevation was not marked by any gross structures, such as polypoid projections as seen in the rabbit and pig, but it was essentially an increase in the stroma layer. The epithelial cells covering this elevation, except for being slightly more columnar,



Fig. 1. 7, 8. Longitudinal section of a guinea-pig uterus, *a*, to show the coils of the Fallopian tube, *t*, and its entrance into the uterus near the region *b*, which is enlarged in the next figure. In this case the tube enters virtually at the apex of the uterus where a thickening of its wall exists.

resembled the epithelial cells lining the main portion of the uterine cavity. The epithelial cells of the tube were still more columnar. Many of the lumina of the uterine glands within this elevation contained some of the ink which had been injected within the uterine cavity. The stroma cells were packed more densely near the tubal ostium than elsewhere. In this region also, as mentioned above, this stromal layer had the greatest depth, being easily five times as deep as the corresponding layer in the main body of the uterus. Of particular interest was the large amount of plain muscle tissue, chiefly circular in arrangement, which guarded the tubal ostium like a sphincter (*m*, Fig. 2). That this increase in plain muscle is absolute,

and not due to a tangential section of the muscle layer, is obvious from the fact that the section is through the axis of the terminal portion of the tube. A few lymph vessels were seen in the periphery of this muscular layer, and only rarely did these vessels penetrate more deeply into the wall of the uterus.

MOUSE.—The specimen was obtained from an adult female white mouse that was killed with ether. The animal was not pregnant. Bouin's fixing fluid, which was injected into each cornu of the uterus, soon appeared in the ampulla of the tube. It was evident that the



Fig. 2. $\times 90$. Guinea-pig uterus; a magnification of the region *b* in Figure 1. The lumen of the tube, *b*, is in direct communication with the uterine cavity, *a*. The stromal layer is thick here and contains uterine glands, *g*, almost up to the tubal ostium. Although the section is cut longitudinally to the axis of the tube, a marked thickening of the musculature, *m*, is evident, indicating a possible sphincter action.

tube joined the uterus almost at right angles near, but not at, the apex of the cornu. Both cornua were serially sectioned in paraffin at a thickness of six micra, and stained in Mallory's connective-tissue stain. One cornu was sectioned transversely to its axis, the other was cut longitudinally.

Both specimens showed the same general morphological structure. In brief, the entrance of the tube into the uterus was marked by a

very definite mound-like protrusion, as if the end of the tube were partly inverted into the lumen of the uterus (Fig. 3). Through the



Fig. 3. 80. Cross-section of uterus of a white mouse showing the entrance of the tube, *b*, into the uterine cavity, *a*, near the apex of the cornu. In this region the mucous folds guarding the tubal ostium are markedly developed, and one, *c*, is situated quite laterally. Any distention of the uterine cavity might easily compress these folds over the tubal opening and effectively block this passage.

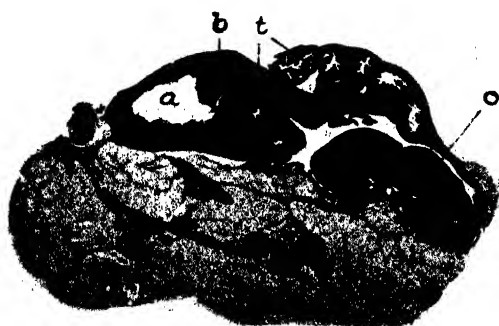


Fig. 4. $\times 8.3$. Section of uterus, tube and ovary of rat. The uterine cavity is represented by *a*, the tube with its many convolutions by *t*, and the ovary by *o*. The area *b*, marking the entrance of the tube into the uterus, is enlarged in Figure 5.

ventre of this projection the tube entered. The epithelium at the tubal ostium resembled more that of the tube than that of the uterine

cavity. No glands were seen in this protruding structure in which the stroma cell layer was increased in thickness, but less compact than elsewhere. A slight increase in the circular muscle at the tubal ostium, as well as a blood supply better than in the adjoining tube or uterus, was noted. It was difficult to determine with any degree of certainty the amount of lymph supply to this region; however, it was insignificant in comparison with the large supply found in the rabbit and pig.

RAT.—An adult female rat, that was not pregnant nor in œstrus was injected with India ink into the right uterine cornu. The intra-



Fig. 5. $\times 120$. Tubo-uterine junction of rat; an enlargement of *b*, Figure 4. Again, a mound-like elevation marks the entrance of the tube, *b*, with the uterine cornu, *a*. The increased circular plain muscle, *m*, suggests a sphincter action. Apparently the ink, particles of which, *i*, are in the uterus, never entered the tube.

uterine pressure was controlled with a mercury manometer, and even when the pressure reached 250 mm. of mercury no ink entered the tube. While this pressure was being maintained, the uterus was ligated and placed in Bouin's fixing fluid. The specimen was subsequently serially sectioned in celloidin and stained with iron hematoxylin and Van Gieson stains.

As will be seen from Figure 4, the tube joined the uterus in a manner similar to that found in the white mouse, that is to say, the juncture was not at the very apex of the cornu, but slightly below this point. A definite elevation in the uterine cavity, conical in character and again similar to the one found in the white mouse, was present at this ostium. The epithelium lining this elevation was slightly different from that found in the neighbouring uterine cavity and tube, in that the individual cells were cuboidal and contained only a little cytoplasm. Particles of India ink were present at the very ostium of the tubal orifice (Fig. 5), but none of this injection mass had entered the tube. The stroma layer was again relatively thick, and the individual

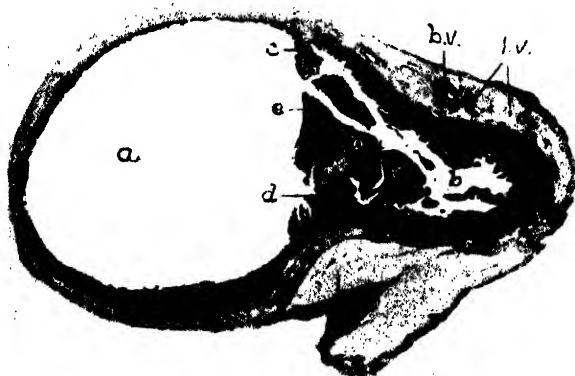


Fig. 6. $\times 7.7$. Section of the pregnant uterus of a rabbit. At the junction of the tube, *b*, with the uterine lumen, *a*, several projecting folds, *c* and *d*, are seen which partially block the tubal ostium. A bit of fetal membrane is at *e*. Blood vessels, *b.v.*, and lymph vessels, *l.v.*, are recognisable. The marked thickness of the muscle layer at *d* is given in greater magnification in Figure 7.

stroma cells were less compact than those in adjoining areas of the uterus. One of the striking features was the large amount of circular muscle at the tubal ostium (*m*, Fig. 5). The blood supply to this general region was good, but not unusually so. Only a few small vessels, apparently lymphatic in character, were seen.

RABBIT.—In the rabbit one could detect with the unaided eye the presence of numerous polyp-like masses within the cavity of the uterus at the tubal ostium. With a hand lens from twelve to eighteen of these projections were readily counted; they formed a compact mass, which occupied completely the opening of the tube. After the uterus was opened longitudinally at this point the individual polypoid

masses had two or more smaller protrusions on them. The average length of these large projections was about 1.2 mm. In this animal also the tube joined the cornu of the uterus obliquely (Figs. 6 and 8). In the specimen shown in Figure 8, ink did not pass into the tube until a pressure of 60 mm. of mercury had been reached.

Microscopically, the polypoid projections were covered with ciliated columnar epithelium which was virtually identical with the epithelial lining of the tube; the uterine epithelium was relatively more cuboidal.



Fig. 7. 1890. Rabbit uterus; enlargement of area *d* in Figure 6. The base of a mucous fold is represented as situated between the uterine cornu, *a*, and the tube, *b*. The stromal layer is indicated by *s*. At the base of this layer is a well defined circular layer of plain muscle, *m*, having numerous lymph vessels, *l.v.*

Only a few glands were seen, and these were at the base of the most lateral projections. The bulk of each protrusion was made up of loose connective tissue which contained an average number of blood and lymph vessels. The plain muscle layers, chiefly the circular, were definitely increased at the tubal ostium (Figs. 7 and 8). In this respect a specimen obtained from a pregnant uterus was of particular interest; for in this case, as is shown by Figure 6, some of the polypoid

masses were made to project well into the lumen of the tube. One of these masses was particularly large, and its base rested on a marked elevation of circular muscle (Fig. 7). Examination of serial sections of this region showed that this marked increase in circular muscle was not always capped by a polypoid projection, but was well within the uterine cavity for a portion of its extent. A peculiar feature of this specimen was that this bit of circular muscle was markedly developed only for about a half of the tubo-uterine juncture. In Figure 8, taken from a non-pregnant uterus, the circular arrangement is well represented on both sides of the tubal lumen. Again the blood supply to this part of the tube and uterus was unusually abundant. Lymph vessels were present in great numbers within the polypoid masses, plain muscle and adventitia.

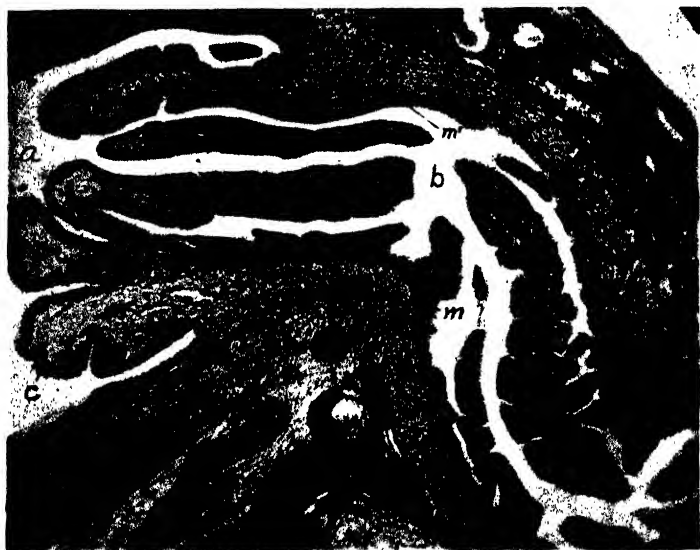


Fig. 8. $\times 40$. Uterus of a rabbit. The animal was not pregnant. The tube, *b*, enters the uterus, *a*, obliquely. At this junction there are numerous polyp-like projections, *c*, some of which are continuous with the longitudinal folds within the tube. The circular muscle is prominent at *m* and *m*¹.

CAT.—At the end of a sacrifice experiment on an adult non-pregnant cat, India ink was injected into the right cornu of the uterus in the direction of the tube. Since no ink escaped into the abdominal cavity even though considerable pressure was exerted upon the syringe, it was decided to investigate the reason why no ink entered the tube. The tubo-uterine juncture, which showed that the tube joined the uterus obliquely, was fixed in Bouin's solution and sectioned serially in celloidin. This animal gave the first clue as to the mechanism which prevented the injection of the lumen of the tube.

Examination of the sections showed that there was a definite elevation within the uterine cavity at the point where the tube entered (Fig. 9). Through the centre of this elevation the lumen of the tube continued, and opened in an irregular fashion near the apex of this more or less regular protrusion. The mound-like mass, *d*, in this figure was shown by a study of the serial sections to be an elaborate extension of one part of the elevation. The epithelium lining this elevation was a transition form between the relatively flat cells of the uterine mucosa and the more columnar cells lining the tube. Uterine glands were seen mainly at the peripheral portion near the base ;

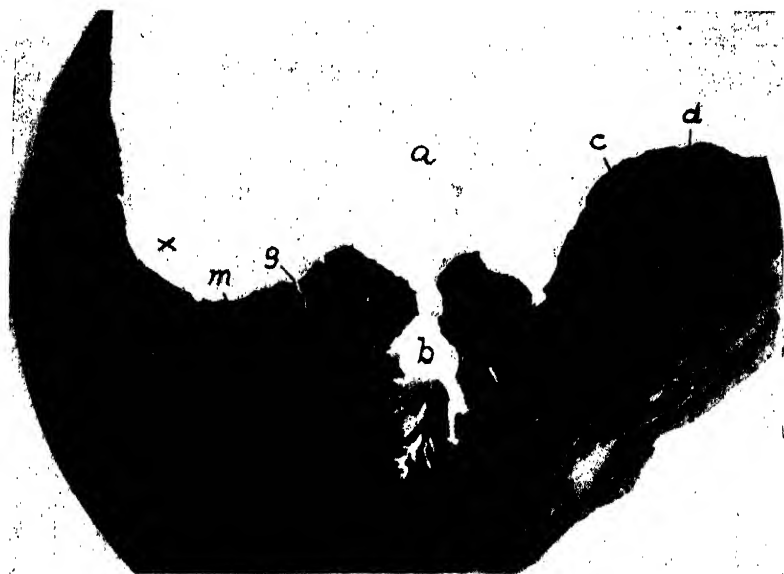


Fig. 9. $\times 50$. Uterus of a cat. The tube, *b*, joins the cornu, *a*, obliquely near the apex, *x*. At this junction are several folds, some of which have glands, *g*, near the ostium, whereas others, *c*, have the uterine glands limited as at *d*. The circular muscular layer at *m* is well developed.

a few structures resembling large uterine glands, *g*, were observed only on one side of the elevation. The stroma layer was relatively dense in this elevation, and contained a large amount of fibrous connective tissue. The plain muscle, particularly the circular band of fibres, was well developed, and again suggested a sphincter activity. A good blood supply to this general region was noted ; lymph vessels were few and small.

A wax-plate reconstruction was made of this specimen, but since

Figure 9 shows the essential features of this specimen no further illustrations were deemed necessary.²

DOG.—The specimen was obtained from an adult non-pregnant female dog whose uterus was large and firm, suggesting an early pre-



Fig. 10. $\times 40$. Section of the uterus of a dog to show the oblique entrance of the tube, *b*, near the apex of the uterine cornu, *a*. The two folds, *c*, at this point are enlarged in Figure 11.

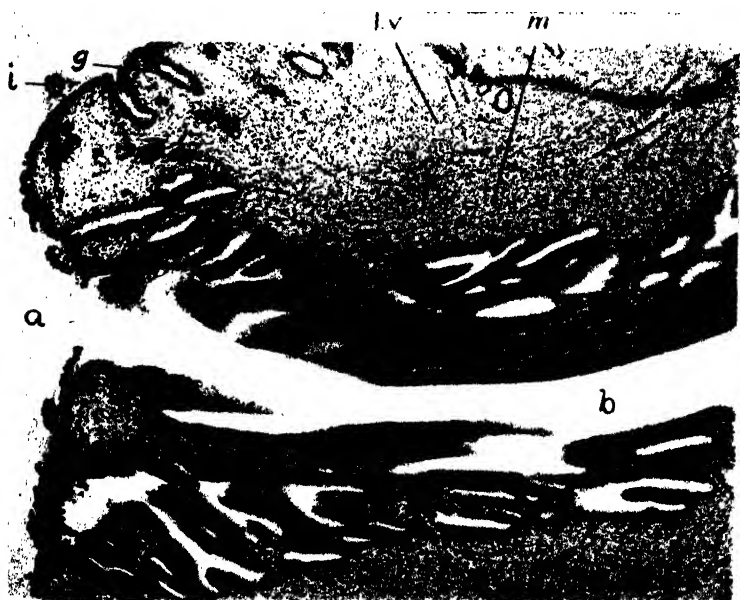


Fig. 11. $\times 70$. Enlarged photograph of the tubo-uterine junction of the dog as given in Figure 10. The tube, *b*, enters the uterus at *a*. Uterine glands, *g*, are near this point. The plain muscle layer, *m*, is increased and is supplied by a moderate number of lymph vessels, *lv*. Although ink was injected into the uterine cavity under pressure, some ink particles, *i*, are seen on the uterine epithelium, but none have entered the tube.

² This wax plate reconstruction, as well as the taking of the photograph for Figure 14, was made possible through the co-operation of Dr. George L. Streeter, of the Department of Embryology, Carnegie Institution, Washington, D. C.

menstrual state. India ink was injected into one of the cornua, and although considerable pressure was used, no ink escaped through the tube. As shown in Figure 11, particles of ink are present at the very tubal ostium, but none are found in the lumen of the tube, thus indicating that the lumen was closed. The tube joined the uterus obliquely and not at the very apex of the cornu (Fig. 10). This juncture, together with the ovary and tube, was fixed in Bouin's solution.

It was seen (Fig. 10), that there were numerous large folds and mucous projections at the apex of the cornu, and the protrusion which marked the entrance of the tube was not more conspicuous than the others. The ciliated epithelium at the tubal ostium was highly columnar and resembled more the epithelium of the tube than the

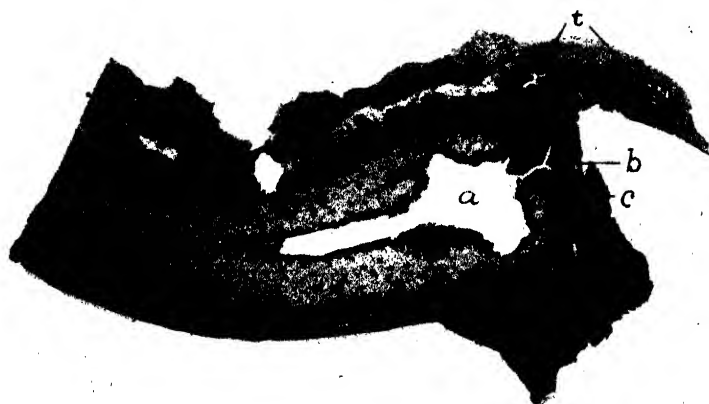


Fig. 12. $\times 5$. Section of the uterus of a young lioness. The tube, *t*, with its numerous convolutions joins the uterus, *a*, obliquely. A slight mucous fold is at *c*. The area *b* is enlarged in Figure 13.

slightly less columnar epithelium of the uterine cavity. Uterine glands were present almost to the very opening of the tube. The stroma cells were very loosely arranged at the extremity of the mucous projections; however, they were more densely packed at the base where fibrous connective tissue was also more in evidence. Plain muscle tissue, particularly in the circular layer, was well developed (Fig. 11) and appeared to sweep down with the corresponding layer of the tube. The usual good blood supply was present in this region; but the lymph vessels were small and few.

LION.—It is obviously difficult to include the lion in the group of laboratory animals. However, it happened that a female lion cub which was born and raised in the local zoological park, after having

reached the age of one and a half years, developed a deformity of the legs, not unlike rickets, which made the animal unfit for exhibition purposes. About two hours after the animal had been killed with potassium cyanide it was possible to obtain the reproductive organs. India ink was injected into the left cornu of the uterus, and although great pressure was exerted upon the syringe, no ink escaped from the tube; subsequent histological examination failed to show any ink within the lumen of the tube (Fig. 13). With the uterine cavity still under pressure the tubal end of the uterus was fixed in formalin and sectioned serially in celloidin.

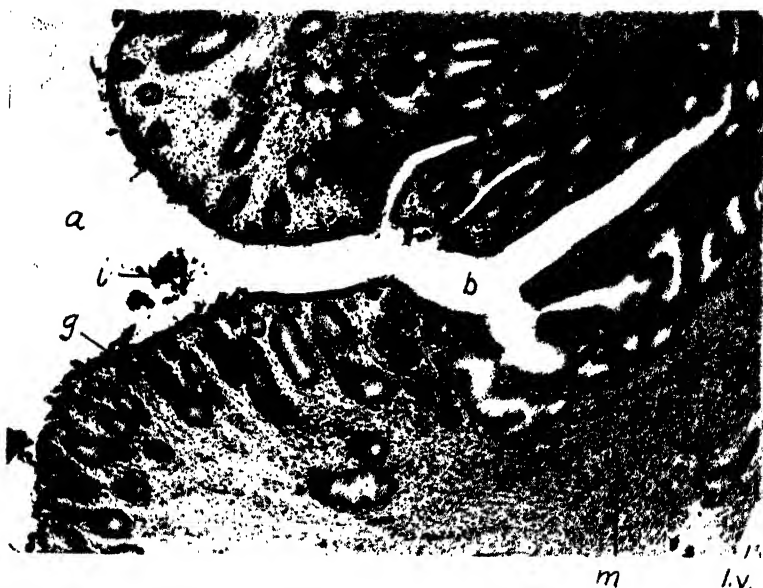


Fig. 13. $\times 100$. Uterus of a lioness; a magnification of area *b* in Figure 12. Uterine glands, *g*, are at the very junction or tube, *b*, and uterus, *a*. The circular layer of plain muscle, *m*, is increased. Some of the injected ink, *i*, entered the tube. A few large lymph vessels, *l.v.*, were observed.

The histological sections showed that the tube joined the uterus obliquely (Figs. 12 and 13). There was only a slight elevation within the uterine cavity at the tubal ostium. Again the ciliated epithelium covering this region was slightly more columnar than that elsewhere in the uterine cavity, and in general resembled the tubal epithelium. Uterine glands were present almost to the very opening of the tube. Stroma cells were relatively few near the epithelial layer, but were more compact and were joined by fibrous connective tissue at the muscle layer. Again the circular layer of plain muscle predominated at the tubo-uterine junction (Fig. 13). The blood supply to this

region was very good. Lymph vessels were not numerous. The muscular layers and adventitia had large vessels (Fig. 13), whereas the stroma layer had only a limited lymph supply.

FIG.—All the specimens of the sow's uterus were obtained in a fresh condition from a neighbouring slaughter-house. With the unaided eye large polyp-like projections were seen guarding the tubal ostium and projecting into the uterine cavity. If the uterine cornu was injected with fixing fluid under pressure, then these projections appeared more flattened. An idea of these masses can be gained from Figure 14, which was made from a specimen macerated in 30 per cent.

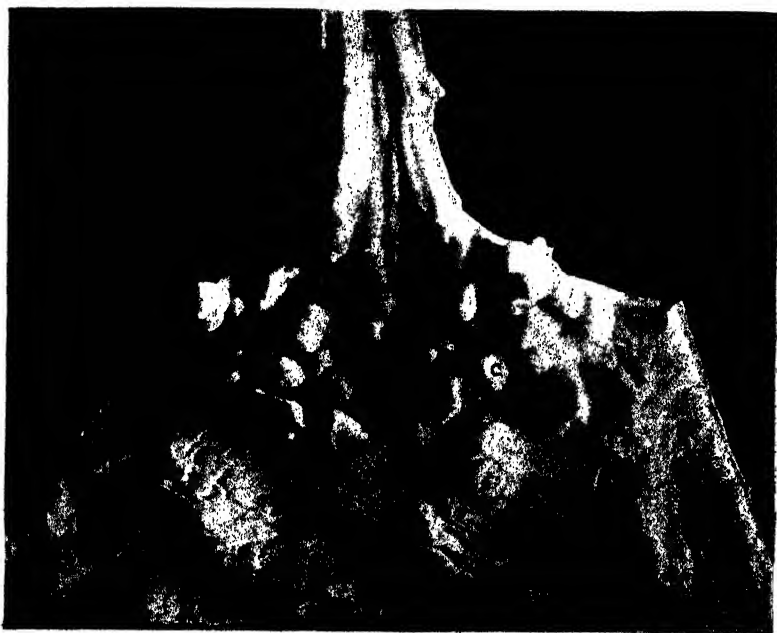


Fig. 14. $\times 4.6$. Photograph of a dissection of the mucous coat at the tubal-uterine junction in the pig. At the junction of the tube, *b*, and the uterus, *a*, are seen numerous polyp-like projections, some of which, *c*, are sharply outlined, whereas others, *d*, are more flat and blend more readily with the uterine mucosa. alcohol for 24 hours; the mucosa was then dissected off from the underlying muscular coat and the specimen pinned out on cork and fixed in formalin. It will be seen that the polypoid masses are distributed irregularly at the tubal ostium, and although about 37 individual bulbous masses can be counted, several of them frequently are on one stem. In general it will be noted that they are more numerous near the opening of the tube, and gradually become less peripherally in the uterine cavity. As a rule, the longitudinal folds within the tube terminated in one or more of these projections which

were usually not pedunculated. The polyps were frequently 2 mm. high.

The material for Figure 15 was taken from an adult sow whose right uterine cornu was injected with India ink, and it was not until a pressure of 100 mm. of mercury was reached that any ink entered the tube. This figure illustrates very well the oblique angle at which the tube joins the uterus. The epithelium covering these polyp-like masses was slightly more columnar and also contained more cytoplasm than the epithelium elsewhere in the uterus; it resembled more the epithelium of the tube. Uterine glands were quite common in

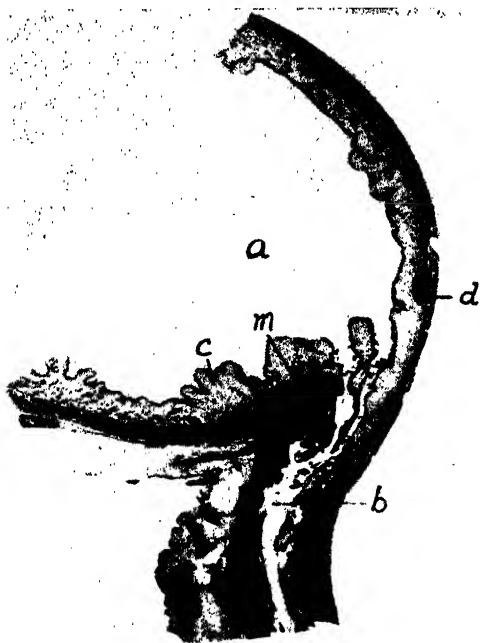


Fig. 15. $\times 5.5$. Section of a pig's uterus, to show the oblique manner in which the tube, *b*, joins the uterus, *a*. Polyp-like projections, *c*, guard this communication. The circular muscle layer at *m* is well developed. Uterine glands do not extend beyond the point, *d*. In several instances, apparently due to the efficient closure of the tubal ostium by these polypous masses, the uterine wall was ruptured before any material injected into the uterine cavity escaped into the tube.

this general region and sections of such glands were frequently seen at the base of the polyps. The stroma layer was very loosely knit in the body of the polyp-like projections but became more compact at the base. The circular muscle layer was only slightly increased at the tubo-uterine junction, and the bulk of this increase was on the side of the tube which made the acute angle with the uterus. In fact, the musculature at this point was only slightly greater than that in the

adjoining part of the tube. There was the usual good blood supply in this region. Of particular interest was the large amount of space occupied by the lymph system. Not only were the polypoid masses frequently almost completely filled by a lymph sinus (Fig. 16), but the entire stromal layer as well as the muscular coats and adventitia had large vessels. It is difficult to think of any tissue which shows a prettier lymphatic picture than that offered by this region.



Fig. 16. $\times 38$. Section of a pig's uterus near the tubal osium to show the nature of the large lymph sinuses, *l.s.*, which frequently occupy a large part of a polypous projection, *c*. The axis of the uterine glands, *g*, is more oblique as the tube is reached. The uterine lumen is given as *a*. Numerous lymph vessels, *l.v.*, are in the muscular coat and adventitia.

Literature and Discussion.

Anatomically, not very much has been written on the tubo-uterine junction in lower animals. Bischoff in 1852 described very well the gradual transition of tube and uterus in the guinea-pig; but he did not note any mucous folds at this point. Allen, in 1922, mentioned valve-like folds which guarded the entrances of the oviduct into the uterine cornu of the mouse. The most recent account was that by Kelly, in

1927, who reconstructed the uretero-tubal junction in the guinea-pig and showed that numerous folds of mucosa guard the tubal ostium.

It is of course impossible to make generalisations on the morphology of the tubo-uterine junction from the material detailed above. However, except in the rat and guinea-pig, the tube joined the uterus at an angle near the apex of the cornu. This relationship was particularly obvious in the case of the pig and rabbit. For the guinea-pig Kelly stated that the uterine horn was a trumpet-like expansion of the tube which did not enter its wall obliquely. Taken by and large it seemed as if the tube were partly invaginated into the uterine cavity, and in favour of this view may be mentioned that the epithelium resembled more that of the tube, and that the muscular coats of the tube swept into the uterus for a short distance, e.g. Figure 15, before they were joined by the corresponding coats of the uterine wall. Again, uterine glands were absent at the junction in many of the animals thus stressing a tubal characteristic.

The character of the mucous folds or polyp-like masses was not constant. There was a great difference, not only in size, between the large polypoid projections of the pig and rabbit and the relatively small folds in the rat and dog, but also in the number of these folds. As a rule, the folds were more developed on that side of the ostium which was nearer the apex of the cornu.

One feature was virtually constant for all animals, namely, the increase in the size of the sphincter muscle at the tubal ostium. In the mouse this musculature was scant. Possibly certain physiological changes in the uterus, such as pregnancy, caused an increase in this as well as the remaining muscular layer. Such a condition might explain the interesting ridge of musculature in the pregnant rabbit (Fig. 7) particularly so since the non-pregnant uterus of the same species did not show such a marked muscular development (Fig. 8).

The large lymph sinuses within the polypoid projections, particularly in the pig, were very unusual. The general morphology of these lymphatic vessels has recently been described by Andersen for the pig. Large lymph vessels were seen not only in the mucous folds, but also in the plain musculature and adventitia. The smaller the animal the fewer were the lymphatics; the lioness was an exception.

Physiologically, the tubo-uterine junction has received considerable study and speculation. Many investigators have found it difficult at times to inject the tubes from the uterus, but only a few have studied the anatomy of the region in order to find out a possible reason for the difficulty. Allen noticed that it was difficult to inject the oviducts from the uterus in the mouse, but he found that valve-like folds of the mucosa guarded the entrance of the oviduct into the uterine cornu, and thus there was an anatomical basis for the difficulty

with the injection. He stated that the valves guarded against a back-flow of material into the tubes from a distended uterus. Examination of Figure 3 will readily explain why the mound-like folds will collapse and block the passage of material into the uterus, irrespective of the presence of a plain muscle sphincter in this region which need only play a minor part in the occlusion.

Other investigators, v. Mikulicz-Radecki, Lueg, and Nahmmacher, believed that a mechanism was present that prevented the transport of fluid from the uterine cornu into the tube of the rabbit. This mechanism they believed to be due to the ordinary pressure exerted by the normal peristaltic force of the tube in a direction which was towards the uterus. Not until this force was overcome by the pressure of the injection was any contrast fluid which was opaque to the roentgen ray forced into the tube. These authors made no histological study of the tubo-uterine junction and therefore were unable to consider the polypoid projections which surrounded the tubal ostium at this point (Figs. 6, 7 and 8). Undoubtedly the efficiency of the closure of the tube at this point was attested to by the fact that these authors did not find within the tube or peritoneal cavity any of their injection mass which had been coloured with indigo-carmin and which had been allowed to remain in the uterus four hours under low pressure.

Also in 1926, Bondi, after studying the tube and uterus in the rabbit, advanced a different explanation for the fact that, when he tied off the uterine cornu, material from the resulting cystic extremity of the uterus did not enter the tube. He believed that the occlusion of the tube under such circumstances was due to its anatomical arrangement since it entered the uterine cornu obliquely and thus reminded one of the entrance of the ureter into the bladder. Accordingly, the greater the distension in the uterus, the greater would be the lateral pressure on the tube as it pierced the uterine wall. He studied the morphology of this region microscopically, and it is interesting to note that the large polyp-like folds at the tubal ostium apparently were of no significance in comparison with the course of the tube through the wall of the uterus.

That a sphincter might be responsible for the occlusion of the tube was considered by Schneider and Eisler in 1927. These authors injected iodipin into the uteri of women, and by means of the roentgen ray found in numerous instances a definite sphincter-like constriction at the uterine ostium of the tube. They believed that the sphincter-like contraction which they observed was due to the contraction of the well developed circular layer of plain muscle, and that the fluctuation in transuterine insufflation pressures as noticed by Guthmann were

probably as much due to the contraction of this sphincter as to the peristalsis of the tube.

Rubin has recently stated that he was able to detect a spasm at the tubo-uterine junction in his peruterine insufflation tests for tubal patency. He recorded the pressure fluctuations on a smoked drum, and noticed that in such a case the initial pressure rose well above 100 mm. of mercury, usually from 150 to 180, even reached 200 mm., and then fell to 140 or less gradually, or it fell more sharply to a lower level when more or less typical fluctuations were evident. Whatever evidence Rubin had to substantiate the claim that such a curve was due to a spasm at the tubo-uterine junction only was not presented.

In connection with the Rubin test it will be recalled that Ferguson has reported a marked discrepancy in the pressures necessary for the insufflation in the same individual at different times. Whether this difference was due to the ordinary premenstrual swelling which might partially block the tubal ostium or whether it was due to a spasm of the sphincter at the tubo-uterine junction, or to both factors, was not discussed.

From a study of the musculature at the tubo-uterine junction in the laboratory animals as reported above, it seems reasonable to suppose that a sphincter action might be partly if not entirely responsible for an obstruction of the tube. In many animals this circular muscle layer was well developed, and together with such marked polyp-like projections as were observed, for example, in the pig and rabbit, the contraction of this muscle might approximate these projections and block the tubal opening very effectively. In this respect the polypoid masses might function in a manner similar to the Pfortnerschwulst of the pyloric portion of the pig's stomach in being an accessory sphincter structure, and be of particular use in pregnancy. In the case of the rabbit some of these masses were forced into the lumen of the tube (Fig. 6).

That this sphincter mechanism was effective was easily attested to by those experiments in the pig in which the wall of the uterus ruptured before any material was forced into the tube. Kelly ruptured the uterine horn in the guinea-pig on several occasions without injecting any material into the lumen of the tubes. In one instance he recorded a pressure of 504 mm. of mercury without any injection of the tube. That the uterine wall of the guinea-pig withstood such a pressure is equally remarkable.

In certain injections of the pig's uterus it was noticed that the tube on one side could be injected with relatively little pressure, whereas a corresponding injection on the opposite side was obtained only with much higher pressure.

Whether there is any relationship between the patency of the

uterine ostium of the tube and the various stages in the oestrous cycle has apparently not been definitely determined as yet. Dyroff has considered a relationship between an internal secretion of the corpus luteum and a dilation sensitivity of uterus and tube as mediated by the involuntary nervous system. The patency of the tubal ostium in the pig may thus be determined not only by the tone of the muscular sphincter, but also by the size of the polypoid projections which may vary with the lymphatic engorgement.

As regards the human uterus, Kennedy in 1925 indicated the rôle which a spasm of the isthmic portion of the tube may cause. For example, a spasm of the tubo-uterine junction may be responsible for the pains associated with dysmenorrhea. Again, delayed conception or even sterility might be produced by the occlusion of the tube at its uterine ostium. Finally, it is possible that the entrance of the fertilised ovum into the uterine cavity might be blocked by a sphincter action at the tubo-uterine junction, and a tubal pregnancy be produced. Certain it is that the lumen of the tube at the uterine ostium is very small, and that the sphincter muscles here are well developed (Williams).

Summary.

A brief account has been given of the general morphology of the tubo-uterine junction in various animals. In the rabbit and pig there were numerous polyp-like projections visible to the unaided eye extending into the uterine cavity. Similar folds, but less in degree, were found in the mouse, rat, guinea-pig, and cat; in the dog and lioness they were developed the least. In all animals the circular layer of plain muscle fibres in this region was well developed and suggested a sphincter action, which, together with the mucous folds, might effectively shut off the tube. In fact, in several instances the uterine wall was ruptured before any injection mass escaped into the tube. The relationship of this mechanism to such physiological states as the oestrous cycle and pregnancy, and to such pathological conditions as dysmenorrhea, sterility and ectopic pregnancy is considered briefly.

REFERENCES.

- Allen, E.: *Amer. Jour. Anat.*, 1922, xxx, 297.
 Andersen, D. H.: *Contrib. to Embryol., Publication of the Carnegie Inst., Washington*, D. C., No. 380, 1927, xix, 135.
 Bondi, J.: *Zntrbl. f. Gynäkol.*, 1926, l, 2554.
 Dyroff: *Münich. Med. Wchnschr.* 1926, lxxiii, 341.
 Ferguson, R. T.: *Jour. Am. Med. Assn.*, 1925, 84, 336.
 Guthmann: *Monatschr. f. Geb. u. Gynäkol.*, 1921, lix, 10.
 Kelly, G. Lombard: *Amer. Jour. Anat.*, 1927, xl, 373.
 Kennedy, W. T.: *Jour. Am. Med. Assn.*, 1925, 85, 13.
 Lee, F. C.: *Proc. Soc. Exp. Biol. and Med.*, 1925, xxii, 335 and 470.
 v. Mikulicz-Radecki, F., Lueg, W., and Nahmmacher, W.: *Zntrbl. f. Gynäkol.*, 1926, l, 1364.
 Rubin, I. C.: *Jour. Am. Med. Assn.*, 1928, 90, 99.
 Schneider, P., and Eisler, F.: *Zntrbl. f. Gynäkol.*, 1927, li, 23.
 Williams, J. W.: *Amer. Jour. Med. Sciences*, 1891, N.S., cii, 377.

Clinical Articles

"Lucerne Disease."

(Aphis Disease, Leaf Louse Disease.)

By MAJOR H. ALLEN, R.A.V.C.,

Remount Depot, Mona, Punjab, India.

SEVERAL writers have recorded the occurrences, amongst imported cattle in hot countries, of a peculiar dermatitis which affects the unpigmented parts of the skin and is induced after the ingestion of quantities of certain foodstuffs, such as green clover, lucerne, trefoil or buckwheat.

The white parts of the skin become covered with irritating sores, which are sharply limited to these parts, and do not extend to the coloured portions.

The writer had similar cases in his segregation paddocks at Mona Remount Depot during 1927, amongst the young stock horses, fed on lucerne heavily infested with Aphis in large quantities. The white parts of the head and limbs only were affected.

The inflammation of the parts, however, very soon disappeared, and this was followed by prolonged disquamation.

It is interesting to consider the possibility that a photo-sensitive substance absorbed with the foodstuffs is excreted through the skin and, under the action of the strong direct rays of the sun, is converted into something which produces the irritating effects upon the white patches.

Hutyra and Marek, vol. iii, 1926, p. 633.

"Traumatic Salivary Cyst, with Calcareous Deposits on Outer Wall, Occluding Stenson's Duct."

By MAJOR H. ALLEN, R.A.V.C.,

Remount Depot, Mona, Punjab, India.

SUBJECT.—Chestnut country-bred gelding aged four years, seven and a half months.

HISTORY.—Was admitted for Bastard Strangles involving the face area on April 4th, 1925, and was discharged convalescent on May 4th, 1925.

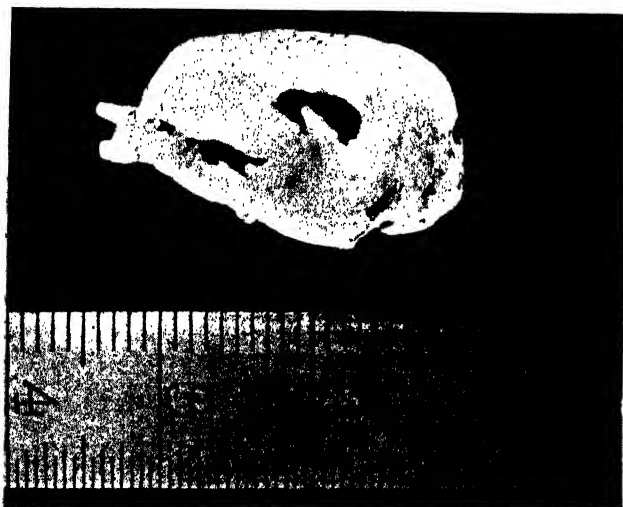
Blockage of Stenson's duct in the shape of a soft movable painless swelling about the size and shape of a guinea-fowl's egg, was noticed on October 17th, 1927, lying over the posterior edge of the left ramus, associated with distension of the duct behind the swelling and damming of the saliva.

The cause was due to injury of the mucous membrane of the duct, the result of incising a strangles abscess in the neighbourhood of the duct, and thereby causing a salivary fistula.

On October 10th, 1928, the swelling appeared as a hard painless, sharply defined, movable enlargement, about the size and shape of a Turkey's egg lying along the posterior border of the left inferior maxilla.

The duct was markedly distended behind the cyst.

TREATMENT.—Consisted in operative removal by means of a longitudinal incision along the lower surface of the enlargement. The wound was carefully closed by interrupted sutures and strict antiseptic precautions were observed during and after the operation on October 21st, 1928.



Calcareous Salivary Cyst.

The patient was discharged as cured on November 12th, 1928. A slight thickening remains of Stenson's duct extending around the posterior edge of the digastricus and inferior left maxilla, to the antero-inferior surface of the parotid gland, within three inches of the base of left ear.

DESCRIPTION OF ENCYSTED CYST.—On removal the cyst was found to be encased thickly with fibrous tissue.

It was about the size and shape of a turkey's egg.

Weight.—4 ounces and 3 drachms.

Measurements.—Length, 7 cms. ; breadth, 4·8 cms.

On removal of the actual cyst by boiling process, all that remained

was a calcareous shell, about the size and shape of a hen's egg, rough, hard and whitish in colour.

Weight.—2 drachms and 22 grains.

Measurements.—Length, 5·53 cms. ; breadth, 3·52 cms.

The contents of the cyst consisted of a thick brownish mucoid material.

The posterior end had a pedicle about half an inch long, binding it down to the lumen of Stenson's duct, thereby causing blockage of the duct and damming of saliva.

Note.—Stenson's duct (Ductus parotideus Stenonis) commences at the antero-inferior surface of the parotid gland, near the insertion of the Sterno-maxillaris, passes along the posterior aspect of the digastricus round the inferior jaw, with the submaxillary artery and vein lying most posterior and along the anterior border of the masseter and entering the mouth obliquely opposite the third upper cheek molar.

The canal consists of an internal mucous and an external contractile coat.

A Case Suggestive of Grass Disease, in Essex.

By RALPH BENNETT, F.R.C.V.S.,

Romford.

SUBJECT.—A very nice bay shire gelding in good condition.

FIRST VISIT (MAY 31ST).—Horse sweating very much, indeed, yet apparently not in much acute pain. Temperature normal; pulse 52-55. Auscultation of chest revealed nothing. Patient rather excited and tried to get out of loose box.

HISTORY.—The horse had been turned out and had also had some rather heated lawn grass. The symptoms of illness appeared quite suddenly. The owner—a very good horseman and very observant—suspected pneumonia and had rugged the horse heavily. He also stated that the horse had had slight regurgitation of food down the nostrils.

TENTATIVE DIAGNOSIS.—Some derangement of the digestive system, but no evidence of real colic, or of twist or rupture. I queried the cause of the excessive sweating. Was it due to excitement from being shut up alone; or (as the day was very hot) from being heavily rugged; or, possibly, to congestion of the laminae of feet?

TREATMENT.—Six drms. of aloes as a ball. Had shoes removed and feet poulticed. Soft food.

SECOND VISIT.—Horse much better. No sweating, but considerable muscular tremors, particularly of shoulder muscles. Physic acting well.

THIRD VISIT.—Improvement, but muscular tremors more marked.

The horse has some difficulty in feeding ; he gets a mouthful of food, but apparently cannot swallow it easily until he takes some water into his mouth as well. Getting very tucked up in the flank.

Prescribed liquor strych. 1 drachm, liquor ferri perchlor. 1 drachm, water 1 ounce, twice a day.

On thinking over the case, began to suspect possibility of grass disease.

FOURTH VISIT.—Horse not quite so well. He is a little uneasy, frequently appearing as though he wishes to urinate. Not much appetite, and still some difficulty in swallowing. He makes the food in the manger very wet by slopping water over it. The horse looks lively, walks well and strongly, but is *very* "tucked up" and begins to take on the "herring" appearance in flanks. Muscular tremors still marked.

FIFTH VISIT.—Brighter, and eating a little better. Gave 10c.c. Nuclein and also 15 grammes of Istizin (Bayer) as a ball, and blistered throat.

SIXTH VISIT.—Appetite slightly improved. Tremors still noticeable. Temperature 100° F. ; pulse 52. The Istizin acted freely.

SEVENTH VISIT.—Quivering of muscles much decreased. Purging ceased and faeces quite normal. Mucous membrane of eye very yellow, as it had been throughout the illness.

EIGHTH VISIT.—Five days later. The horse was found down and unable to rise. After the last visit he had appeared to be rallying well, but suddenly ceased to feed on June 17th, and was found down on the 18th. Destroyed as hopeless.

POST-MORTEM.—Stomach and bowels (large and small) all inflamed. Apparently a very sub-acute inflammation which probably accounted for persistent lack of appetite. The stomach contained a quantity of bots.

Lungs.—Early stage of broncho-pneumonia. Left lung had a small patch of red hepatisation.

Tongue.—The dorsum was quite black, but there was no accumulation of food in fauces and no sign of inflammation around throat.

Other organs all appeared normal.

REMARKS.—This was to me a very unusual case, and although it presents many features in common with grass disease, I am not satisfied that it really was that disease. It does appear though, that it was due to the absorption of some toxin from the digestive tract. The farm is a very good one ; food and hygiene very good ; well above the average. The only doubtful food being the lawn grass which the horse, in common with others, got by accident. No other horses were affected in any way.

In view of the unusual nature of the case, I have thought it best to report it just as jotted down in my case-book day by day; with observations as they occurred to me.

Temperature remained normal throughout, and the pulse never exceeded 55 to the minute. —————

Sheep Dipping Fatalities.

By H. C. ROCKETT, M.R.C.V.S.,

Salisbury.

ON a farm near here there was an outbreak of sheep scab, and the sheep were dipped in the usual way with a proprietary dip (I am not sure which) and they did quite well. However, the owner was advised by his friends that there was no dip like "So-and-so's" (I do not mention names for obvious reasons), and there was no man who could dip sheep like he could.

So the owner decided to dip again, and I am told that each sheep was kept in the dip for two minutes. At the time of dipping one or two sheep became unsteady in their gait, but the man who did the dipping said that they would recover quite soon.

The shepherd who helped with the job complained that his arms and face were badly blistered and swollen for a day or two after.

About a fortnight or a little more later I was called in to see the sheep as several were very unsteady and a couple were down and almost comatose with the head twisted round to the side.

I slaughtered these and made a careful *post-mortem*, but could find nothing to account for the condition, so removed the heads and took them home for further examination and stated that the trouble was probably due to worm cysts, but on opening the skull could find none.

I did find in one case that the ear on one side was badly infected with maggots, but in the other sheep this was not so, so I looked further and removed the brain carefully and then in each case found between the bone and the dura an appreciable amount of pus which could be traced through to the ear, hence, no doubt, the maggots in one case. I have never seen a similar case and think that the dip used must have been pretty strong and contained some caustic which gradually penetrated through to the brain.

This may be quite wrong, but I do not know how else to account for the condition. There was no general infection of the brain. About a dozen sheep were affected in all, but the others were slaughtered as soon as they showed symptoms, but the butcher who killed them told me that he had opened the skulls of a couple and found the same condition.

Ruptured Diaphragm.**Cairn Terrier, 15 Months Old.**

By BERNARD CORTON, M.R.C.V.S., M.P.S.,

Bournemouth.

THE dog was run over by a motor car on August 21st, and on examination immediately* was found to be suffering from shock and injury to right hind limb. He was given 15 minims of Inj. Ol. Camph and ordered to be kept quiet, with no solid food.

September 1st. A slight improvement manifest. The injury to the limb was diagnosed as fracture of the ischium. There was no inclination to run about, but restlessness was marked.

September 3rd. Urination difficult, the urine being tinged with blood. Hexamine gr. iij twice a day prescribed.

September 5th. No marked improvement.

September 10th. Breath very offensive and breathing rather laboured. Salol gr. v twice a day. Ruptured diaphragm suspected.

September 14th. Abdominal breathing pronounced, animal exhibited signs of pain on being lifted. Rupture of diaphragm diagnosed.

September 17th. X-ray photograph taken. Result disappointing. nothing abnormal being apparent, not even the fracture.

Breathing still mainly by the abdominal muscles. The animal on this day was more himself, except for a bout or two of pain.

September 20th. Animal quite lively and playful till the evening when he cried out and died very shortly.

P.M. Examination.

The first noticeable feature of the case when the body was placed upon the table was the lack of bulk of the abdomen. On opening the cavity of the abdomen the first thing to spring into view, instead of the omentum was the liver, lying on the floor. The omentum, stomach and small intestine were not visible. It was at once seen that the diagnosis of "ruptured diaphragm" was correct, the organs not in sight having wandered into the thorax.

To ascertain the disposition of the displaced viscera in the thorax, the left chest wall was removed with the following result:—

The stomach dilated with gas was in the posterior part of the left side of the chest against the diaphragm. In front and below were the coils of the small intestine. The left lung, only about a tenth of its normal size, was situate above the intestine. The omentum and spleen were found in the right half of the thoracic cavity, and the right lung was equal to the left in size.

The rupture in the diaphragm was in the left half of the tendinous

centre, and was of considerable size. The edges were thickened, showing signs of an attempt at repair. The ischium was found to be broken obliquely at the base of the tuberosity.

Remarks.

This case illustrates the disappointment that may arise from an X-ray photograph. The ischial fracture was not revealed, though it was quite apparent during life. Nor was the abnormal position of the viscera made evident. If the dog had had a bismuth or barium meal before the radiation valuable information would have been forthcoming.

The length of time that the patient lived is interesting to note. It was evident from a careful examination that the rupture was caused directly by the accident, and it is probable that the viscera found their way, urged by the abdominal contractions, into the thorax more or less gradually. This piecemeal invasion of the chest accounted for the increasing severity of the respiratory symptoms.

Reviews

The Art of Milking. PROFESSOR A. C. AGGARWALA, B.Sc. (Honours), M.R.C.V.S., Punjab Veterinary College. *Veterinary Bulletin*, No. 20. Published by the Department of Agriculture, Punjab.

IN a small and well illustrated brochure entitled "The Art of Milking," Professor Aggarwala has set before his readers in India a clear picture of the advantages of carrying out the "Art of Milking" scientifically and properly, illustrating very lucidly that by adopting methods of cleanliness the economic value of the dairy cow can be very much increased in India--as has already been instilled into the agriculturist and dairy farmer of the West.

One very great difficulty, however, which does not occur in European countries, has to be contended with in India--and that is that, quoting from this little handbook, "An overwhelming majority of the population of the country holds the cow in extreme veneration and love purely on sentimental grounds, and owing to this the elimination of useless animals is rendered an impossibility. The result is that many millions of cattle are economically unprofitable, and mean a heavy drain on the resources of the people. On a rough estimate there are about 15,000,000 cattle which are useless and of no value whatever. If the life of these animals is taken at five years, and the value of food consumed each at Rs. 10 per annum, the total money spent apparently, without any profit, would amount to Rs. 750,000,000 annually. . . . It is not the cow that is keeping the people, but the people who are keeping her; whereas the reverse should be the case."

This paragraph expresses a difficulty which is not met with amongst European nations, and pioneers such as Professor Aggarwala who wish to introduce modern agricultural methods of dairying into India are "up

against it." However, nothing was ever done without hard work and opposition, and if only those who are carrying out dairying methods in India can be induced to follow out the modern methods mapped out in this little brochure, not only will the dairying industry benefit (to their advantage pecuniarily, as well as in other ways), but the presence of disease will be lessened, thus benefiting the pockets of the owners as well as the cattle themselves.

Aids to Dispensing. A. O. BENTLEY, Ph.C., Director of the Department of Pharmacy, University College, Nottingham. Pp. vi+200, with 7 figures in the text. London: Baillière, Tindall & Cox. Price 3s. 6d. net.

A SMALL handbook comprising 200 pages. The book, whilst essentially prepared for students of the Pharmaceutical Society, will be found of great value to both veterinary students and practitioners.

All branches of dispensing are dealt with, and the paragraphs being short and concise the book becomes easily readable.

The chapters dealing with powders and mixtures will greatly assist clean and accurate dispensing, whilst those on the preparation of percentage solutions, and sterile solutions for hypodermic injection, are very simply explained; and are always handy for reference.

The subject of chemical incompatibility is dealt with fairly fully, but at the same time in a very practical manner. Reference to this book will assist the busy dispenser.

Having been written to meet the requirements of the medical dispenser, such things as horse balls and other essentially veterinary preparations are not included; at the same time ointments, plasters, pills, etc., are dealt with fully.

The chapter dealing with emulsifying agents is instructive.

We strongly recommend this little book to practitioners, and think it is one which no Class C and D student should be without.—J.G.W.

Personal

LT.-COL. H. A. REID, O.B.E., F.R.C.V.S., D.V.H., has been appointed to represent New Zealand on the League of Nations Conference at Geneva, as Technical Specialist in the subject of the Inspection of Animals and Animal Products.

MR. JOHN G. WRIGHT, F.R.C.V.S., has been appointed to the Professional Chair of Pharmacology and Therapeutics in the Royal Veterinary College, London, in the place of Professor Smythe, whose resignation was recently caused by the severe illness, and subsequent death, of his father, Mr. D. Smythe, of Falmouth.

Professor Wright, who was a graduate of the London College, had a very distinguished college career, his honours including not only many first places in the medal list, but also first-class honours in the final examination, a very rare distinction.

THE MIDDLESEX COUNTY COUNCIL has appointed Capt. Sidney Villar, M.R.C.V.S., as County Veterinary Inspector under the Milk and Dairies (Consolidation) Act (1915), and the Milk and Dairies Order of 1926. The appointment is worth £750 together, with an allowance of £200 a year as motor allowance, and rises by annual increments of £25 to £900.

THE VETERINARY JOURNAL

Editor :

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HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING,
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PRINCIPAL OF THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor :

GLADSTONE MAYALL, M.R.C.V.S.

FEBRUARY, 1929.

Editorials

IMPORTANT REPORT UPON THE COLONIAL VETERINARY SERVICES.

IN this month's issue we publish somewhat extensive extracts, which are of the deepest interest to the veterinary profession, from the Report of a Government Committee appointed by the Secretary of State for the Colonies to investigate the conditions of the Colonial Veterinary Service.

The italics are ours, and are put in with the view to doubly emphasising certain points.

The Committee was a very carefully selected one, three of the number being members of the veterinary profession, under the chairmanship of Lord Lovatt.

Lord Lovatt and his Committee thrashed out the whole matter very thoroughly, and their report is a scathing comment (unfortunately only too true, as the progressive members of the Veterinary Profession have for a long time realised) on the neglect, which has been only too well known by the members of the profession, towards not only Colonial veterinary science, but veterinary science in general, in the past.

We recommend a perusal of the whole of the report* to every member of the profession, not only those who are in the Colonial service, or who have relatives about to enter, but to every holder of the M.R.C.V.S. Diploma.

* Published by His Majesty's Stationery Office, Kingsway, London, W.C.2.
Price 9d.

PEOPLE'S DISPENSARY CARAVANS AND MINERS' SICK ANIMALS !!

MAJOR BRUNEL COHEN, M.P., writing from the House of Commons, in a letter to the *Times* for February 14th suggests that donations should be sent to the Treasurer of the P.D.S.A., 14, Clifford Street, London, N.1, for the reason that "The People's Dispensary for Sick Animals are always to the fore in every effort for the alleviation of all animal suffering, and upon receipt of the news as to the present deplorable conditions they immediately dispatched travelling caravan dispensaries to the distressed areas to do everything possible for the miners' animals."

This, to the unthinking and impulsive, warm-hearted animal lover, sounds romantic and even Quixotic, for to render real help to a sick and suffering animal is as noble a deed as to help suffering humanity, but where is the philanthropy in this instance? If the caravans carried food to starving animals their presence could be appreciated; or even if the so-called "dispensary" had a veterinary surgeon in charge, the sick animals could at least have some chance to have their ailments diagnosed, although how "treatment" could be continued until the poor sheep, or cottager's pig, or cat, or perhaps rabbit, became convalescent, with the caravan and its driver speeding from place to place (regardless of cost of petrol or other expenses), sets one a problem to solve—a problem which the real veterinary practitioner, who earns his own living without appealing for public subscriptions, would know to be impossible and absurd.

There is no doubt, as Major Brunel Cohen very aptly puts it in a further paragraph of his letter, "This practical [*sic*] care for the animals and their painless destruction when necessary, is making a very heavy demand upon the purse of the People's Dispensary for Sick Animals."

One wonders whether it has ever occurred to the kindhearted supporters of the cause of sick animals, that the animals of the poor have just as much a moral right, when ill, to have their ailments diagnosed and properly treated by qualified veterinary surgeons as the more fortunate animal of the richer owner.

It is morally wrong that it should be otherwise when veterinary help can be obtained—and there is no district in England where there is not a veterinary surgeon. To help those who cannot help themselves is a noble thing to do, but to ask the public for subscriptions to encourage the doctoring, or "so-called" treatment of poor people's animals by unqualified men is not humane; it is only because those who give do not think about the commonsense aspect of these things that they not only give willingly, but they often give twice.

General Articles

COLONIAL VETERINARY SERVICE.

Abstract from the Report of a Committee Appointed by the Secretary of State for the Colonies.

*Presented by the Secretary of State for the Colonies to Parliament by Command of His Majesty. January, 1929.**

THE Committee was appointed in July, 1927, with the following Terms of Reference :—

" To frame proposals for obtaining the highest degree of efficiency in regard to Veterinary Research and Administration in the non-self-governing Dependencies that financial considerations permit.

" The questions to be considered would embrace the recruitment and training of Veterinary Officers, their conditions of service, the organisation of Research and Intelligence, the setting up and support of any Institutions required, and methods by which the financial expenditure involved can best be met.

" In framing their recommendations the Committee should bear in mind that the principle of the ultimate creation of a Colonial Scientific and Research Service has been approved by the Colonial Office Conference, and that specific proposals for the formation of an Agricultural Scientific and Research Service for the non-self-governing Dependencies, with which the Veterinary Service must necessarily maintain close liaison, are now being framed."

The Committee consisted of The Lord Lovat, K.T., K.C.M.G., K.C.V.O., C.B., D.S.O. (Chairman); The Right Honourable W. Ormsby-Gore, M.P.; Sir Arnold Theiler, K.C.M.G.; Professor J. B. Buxton, M.A., F.R.C.V.S., D.V.H.; Professor R. T. Leiper, M.D., D.Sc., F.R.S.; Dr. W. H. Andrews, M.R.C.V.S.; Dr. J. B. Orr, D.S.O., M.C., F.R.S.E.; Mr. W. C. Bottomley, C.B., C.M.G., O.B.E.; Major R. D. Furse, D.S.O.; Major G. S. M. Hutchinson (Secretary).

The following witnesses gave evidence before the Committee: Professor O. Charnock Bradley, M.D., D.Sc., M.R.C.V.S., Principal, Royal (Dick) Veterinary College, Edinburgh; Mr. F. R. Brandt, M.R.C.V.S., Chief Veterinary Officer, Nigeria; Lieutenant-Colonel J. W. Brittlebank, C.M.G., M.R.C.V.S., D.V.S.M., President, Royal College of Veterinary Surgeons; Dr. F. Bullock, F.C.I.S., Secretary and Registrar, Royal College of Veterinary Surgeons; Mr. M. Crawford, M.R.C.V.S., Assistant Government Veterinary Surgeon, Ceylon; Mr. J. A. Griffiths, F.R.C.V.S., Chief Veterinary Officer,

* The complete Report can be obtained from His Majesty's Stationery Office, Kingsway, London, W.C.2. Price 9d. net.

Nyasaland ; Major F. T. G. Hobday, C.M.G., F.R.C.V.S., F.R.S.E., Principal, Royal Veterinary College, London ; Mr. A. Holm, C.B.E., F.H.A.S., Director of Agriculture, Kenya ; Captain H. E. Hornby, O.B.E., F.R.C.V.S., D.V.S.M., Veterinary Pathologist, Tanganyika Territory ; Major H. Mason, O.B.E., M.R.C.V.S., late Director, Egyptian Government Veterinary College, Cairo ; Mr. R. J. Roe, M.R.C.V.S., Veterinary Surgeon, Cyprus ; Mr. J. Smith, M.R.C.V.S., D.V.H., Chief Veterinary Officer and Acting Secretary for Agriculture, Northern Rhodesia ; Colonel G. K. Walker, C.I.E., O.B.E., F.R.C.V.S., Professor of Medicine, Punjab Veterinary College, Lahore ; Mr. F. Ware, F.R.C.V.S., Principal of the Veterinary College, Madras ; Professor Warrington Yorke, M.D., Professor of Parasitology, Liverpool School of Tropical Medicine ; Professor L. R. Wilberforce, M.A., Acting Vice-Chancellor and Chairman of the Board of Veterinary Studies, University of Liverpool.

At the invitation of the Committee, representatives from Sudan and Southern Rhodesia took part in their meetings.

INTRODUCTION.*

1. *At the outset of our Report we should like to emphasise the growing importance of veterinary activities in the Colonial Empire. The successful development of public health involves problems of improved milk and meat supply. The advance of agriculture is closely associated with animal husbandry in its widest sense—the use of stock for agricultural operations, transport, manure, etc., and the growth of fodder crops. Finally, there is the economic and sociological importance of animal industries for both export production and local consumption.*

2. We cannot any longer limit veterinary activities to the mere treatment of specific diseases or even to the prevention of the spread of epizootic and enzootic diseases. The increase and improvement of domestic stock of all kinds are essentially part of modern veterinary science. Animal nutrition and animal genetics are now seen to be not only of the utmost economic importance, but also of immense significance in the prevention of disease. Modern developments in immunology have far-reaching applications in animal industry. Resistance to disease either hereditary or directly conferred by the use of vaccines or sera is a vital factor in the progress of any animal industry. *Finally, there is the fact that the advance of modern medical science—so largely the result of observations on animals—requires the continuous collaboration of veterinarians in the solution of such problems as insect-borne diseases like the trypanosomiasis or the little understood*

* The italics are ours, and are made with a view to emphasising certain points and paragraphs of vital importance to the Veterinary Profession.—EDITOR, THE VETERINARY JOURNAL.

category of virus diseases, the causal agents of which are beyond the reach of the microscope.

3. *All these considerations point to the desirability of a new outlook on the importance of the rôle to be filled by the veterinarian, and to the importance of attracting to the veterinary profession men of high scientific training and attainment. At present there is somewhat of a vicious circle. It is complained that the scientific standard of some veterinary surgeons is not as high as it should be, and, at the same time, by treating the veterinary profession as inferior to those of other scientific workers, men of high scientific training are not encouraged to enter it.*

4. From the special point of view of the Colonies it is clear that the problems of animal industry in the tropics have not yet received the same attention as they have in the temperate zones. There are vast new fields to conquer; and, while biological principles may be said to be universal, their application to the conditions of a special environment often involves such radically different emphasis of particular branches of science that the training and experience of those who have to study these different applications may require considerable modification.

5. To give examples: it is obvious that in the tropics veterinary entomology and parasitology present factors unknown to the natural experience of Europe. In the tropics the veterinarian has often to deal with breeds of stock unknown in Europe—breeds whose hereditary characteristics, whose food, and whose environment are so different from the corresponding factors within his previous experience, that he has to readjust his whole attitude. Frequently the veterinarian in the tropics is faced with an entirely different relation between man and his domestic animals from that which he knows at home. There are sociological factors, in some cases religious beliefs, which have to be studied. Further, in the application of modern science to the harnessing of tropical wealth man is faced by the fact that if in the tropics nature is more bountiful than in colder climates she also reveals more terrible powers of destruction. It is perhaps on this account that such vast areas of the tropics, naturally so prolific, are still untamed and their resources but meagrely utilised by man.

Of recent years Britain has done much for tropical medicine, tropical agriculture, and tropical forestry, but as yet but little for tropical veterinary science. It is our earnest hope that henceforward this last sphere of endeavour will receive the attention and support that its importance deserves.

6. Our Report is concerned with the non-self-governing Dependencies of the Empire which are administered under the direction of the Secretary of State for the Colonies. It therefore does not

deal directly with any self-governing Dominion or Colony. At the same time we desire to acknowledge the great assistance which we have had through the association with us of representatives of Southern Rhodesia and the Sudan, and the value of the evidence which we have received as to veterinary work in India. The Dependencies with which we are concerned include Colonies, properly so called, such as Trinidad; Protectorates such as Uganda; and mandated territories under British administration such as Tanganyika Territory. For the sake of brevity we use the term "Colony" to describe any of the territories with which we deal. These territories cover an area of some 2,000,000 square miles with a population of about 50,000,000. With the exception of 160,000 square miles, containing approximately 4,000,000 inhabitants, they lie within the tropical zone.

7. Agriculture is in almost all cases the chief source of their wealth; and agriculture, including stock-rearing, is the principal and traditional occupation of the bulk of the native inhabitants. As compared with the cultivation of crops, stock-rearing is no doubt of secondary importance in several Colonies. Its importance for its own sake is, however, very considerable. Apart from horses, pigs, etc., there are in the Colonies some 18,000,000 cattle and 17,000,000 sheep. In many large areas, such as the Northern Provinces of Nigeria, stock-rearing is one of the principal industries; in nearly all, however, it is of increasing significance that the pastoral industry fails to reach its proper development by rendering stock-rearing an economic proposition.

8. These considerations alone would justify the provision of adequate measures for combating animal diseases and improving the health and nutrition of the flocks and herds. It must be remembered that the Colonies have not, as we have in Europe, the advantages derived from a long period of scientific control backed by statutory regulations. A large number of animal diseases are endemic in the Colonies—particularly in Africa—and the introduction of new conditions with the progress of civilisation almost invariably brings fresh problems and difficulties in its train. Between 1914 and 1925 the cattle population of Nigeria was reduced by as much as 25 per cent. almost entirely through rinderpest. This same disease, in two outbreaks, destroyed 5,000,000 head of cattle in South Africa south of the Zambesi, representing a loss of £20,000,000.

9. The importance of the problem of animal health in the Colonies is, however, by no means confined to the stock industry. Diseases of animals and animal-borne diseases may have a widespread and sometimes disastrous effect on the welfare of the com-

munity at large. Agriculture is affected by lack of animals for tillage and transport, and the evil effects of an absence of stock upon methods of cultivation and manuring must be recognised. Many other industries are affected by the ravages of disease among transport animals. In large areas of Northern Rhodesia, for example, human portage is the only means of transport. Huge districts in Tanganyika have been made unsafe for man or stock by the tse-tse fly, which is now spreading in Nyasaland. In some Colonies the shortage of local supplies of fresh milk and meat is a source of difficulty in the adequate progress of public health. To take an example of a different kind, the aid of veterinary science is needed in attacking the problem of human trypanosomiasis. This disease was responsible for the destruction of one-tenth of the human population of Uganda in 1902 and 1903. These examples, taken at random, may serve to show how serious and far-reaching a menace is presented by the various animal diseases and how important it is to the welfare of the Colonies that their veterinary services should be numerically adequate to their task; staffed with a personnel of high quality; furnished with full and up-to-date information on all matters that concern their work; and well organised and equipped in respect of research.

10. *We regret to have to report that this ideal is very far from being realised. On the contrary, there is evidence that this important problem has in general been seriously neglected. In many Colonies the Veterinary Department appears to be regarded much in the light of a "Cinderella" among the other branches of the service. This attitude is not confined to the Colonies. It is significant of the general status of Veterinary Services that, in 1912, when the Government of India contemplated the abolition of six Inspector-generalships of Departments, it was the Veterinary Department alone which, when the dust of controversy had subsided, found itself left without a head.*

11. The Veterinary Departments of the Colonies are in our opinion generally understaffed. The aggregate strength of the Colonial Veterinary Departments only amounts to 127 qualified officers; that is to say, one officer to every 16,000 square miles, 400,000 inhabitants, or 280,000 head of cattle and sheep. *We consider that the number of specialist and research officers (at present 15) is absurdly small for the many problems which require investigation and for the variety of diseases with which they have to deal. We wish to take an early opportunity of paying a high tribute to the admirable work which has been accomplished, often in the face of great difficulties and much discouragement.*

12. We are satisfied that the general standard of entrance into the Service has been too low in more than one respect. Difficulty

is frequently experienced in obtaining recruits who combine with technical proficiency those personal qualities which are essential if the veterinary officer is to enforce his often unpalatable regulations without undue friction. The Service, too, does not sufficiently attract the man with a scientific bent, and there is a serious shortage of men trained for research work. There is no provision for suitable post-graduate training for officers entering the Service, and—in contrast to their colleagues in the Colonial Medical Services—they even lack the advantage of a preliminary course in tropical veterinary science.

13. We have been impressed by three outstanding defects in the existing organisation of the Colonial Veterinary Services :—

1. There is no advisory authority to the Secretary of State for the Colonies on matters affecting the larger aspects of veterinary research in the Colonies or on questions concerning the personnel of Veterinary Departments and research stations.

2. There is no research station which is charged with the duty of taking a view wider than that of the immediate needs of a particular Colony.

3. There is no adequate system for collecting, editing, and distributing information such as would enable individual officers to keep abreast of the progress of knowledge in their own subjects.

14. The causes of the present unsatisfactory state of affairs may be conveniently grouped under two heads. There are those for which the Colonial Governments concerned are directly responsible and for which the remedy lies in their own hands. Others are due to defects in the training of veterinary officers and to defects in the headquarters' organisation.

To take the first of these groups, the principal causes of trouble appear to be that, with certain notable exceptions, the problem of animal health and nutrition has not been attacked in a sufficiently comprehensive manner and insufficient funds have been provided. At the same time, the personnel of individual Veterinary Departments has not always been such as to command the full confidence of their local government. These governments, therefore, who are, of course, composed mainly or entirely of laymen, feeling uncertain of the quality of the advice given by their local experts and having no central authoritative body to whom they could subject it for confirmation or criticism, have been unwilling to find the money to tackle the problem. We recognise that up till now there has been no inter-colonial organisation whose duty it should have been to examine veterinary problems as they may affect groups of Colonies or the Colonial Empire as a whole, to make suggestions for improvement,

and to place at the disposal of individual governments the results of experience gained in other Colonies or in the world at large.

15. *In the body of our Report we make suggestions both for improving the standard of recruitment for the Veterinary Departments and for setting up a new Central Organisation. On the former point we are convinced that the Colonies must make their Veterinary Services more attractive before they can expect to recruit sufficient men of the right stamp. In particular, it will be necessary to offer higher salaries in the senior grades. The status and prestige of Veterinary Departments must be improved. Better provision should also be made for supervision of the work of individual officers and assisting them by giving facilities for study leave ; for the recognition and reward of merit , and for the promotion and transfer of deserving officers. All this will mean money, and critics may well ask for proof that the trouble and expenditure involved will be worth while. We cannot do better than refer them to the notable example which has been given by the Union of South Africa.*

16. South Africa formerly had an evil and well-deserved reputation for animal disease. Not only was the country ravaged by diseases peculiar to warm climates, or to Africa, but also many of the most serious diseases of the temperate zone had become established there. The actual mortality was always considerable, often very serious, and at times ruinous, and over a large part of the country stock-raising was always an uncertain and speculative industry. In many areas only certain inferior breeds which were disease-resistant could be kept, since the breeding or keeping of many classes of farm stock was impossible. It may be remarked that large areas in our tropical Colonies are in a similar position to-day.

To deal with so serious a situation the South African Government (or, in the first place, the several Colonial Governments of South Africa) built up a large and comparatively well-paid administrative and executive veterinary staff. The most striking and significant feature of their campaign against animal disease was, however, the great encouragement of the research side. The research staff was, as compared with research staffs in most veterinary services, exceptionally large and well-organised, with attractive conditions of service. The central veterinary research laboratory at Onderstepoort was, as it is to-day, the largest institution of its kind in the world. The Veterinary Research Division manufactures vaccines and sera, and in recent years has also undertaken the professional side of veterinary education in South Africa. The annual expenditure on this Division, excluding the Veterinary Division (which deals with administration and field control), has been as high as £120,000, and now averages about £100,000.

The results attained have amply justified the heavy expenditure. The most destructive diseases have been brought under control, and many have been completely eradicated. Stock is now freely introduced into areas which were formerly practically uninhabitable, at least for animals of the more desirable breeds. The change in the number and distribution of domestic animals in South Africa is most gratifying, but probably the best proof of the success attained is to be found in the remarkable improvement in the type of animals kept, and in the confidence with which farmers, living in areas once notoriously unhealthy, now purchase breeding stock of high value.

17. But whatever reforms the Colonial Governments may make in the organisation, equipment, and conditions of their Veterinary Services, we do not believe that satisfactory progress can be achieved unless the conditions under which veterinary officers are trained in this country can be fundamentally improved. As we show later in our Report, there is in the United Kingdom only one portal of entry to the veterinary profession, namely, the possession of the diploma of membership of the Royal College of Veterinary Surgeons. The ordinary training laid down for students taking this diploma is not, in our opinion, sufficient for officers of the Colonial Veterinary Services. These officers are called upon to treat animals in the mass, and to deal not only with the greater variety of diseases than are prevalent at home, but also with questions concerning the improvement of breeds and nutrition. We consider it essential that they should have a more thorough grounding in general science and that they should be given a sound working knowledge of animal genetics and nutrition. Further, although the need of post-graduate training of several kinds is widely recognised, there is at present no veterinary institution in the United Kingdom which can provide the necessary facilities and staff. Nor is there in Great Britain any provision for definite training in tropical veterinary science. Veterinary officers who enter the Colonial Services usually do so without having received any post-graduate training and in our opinion are insufficiently equipped for the work which lies before them.

18. But the trouble goes deeper than this. It is not merely a question of curriculum, but of the conditions under which the training is given. In our opinion these conditions are profoundly unsatisfactory. The main cause is lack of funds. The first veterinary school was founded in 1791 and from the beginning has been handicapped in this respect. The other schools which have been formed later have all suffered from the same defect. As a consequence it has not been possible to offer sufficient inducements to attract enough qualified teachers. Most of the existing staffs appear to instruct in too many

subjects and the accommodation and equipment at their disposal are often lamentably inadequate.

19. In order to check the disturbing evidence which we received on such points as these, we visited the Royal Veterinary College at Camden Town, by invitation of the Principal. We do not hesitate to say that we were dismayed by what we saw. While we were much impressed by the efforts which the Principal and his staff are now making under adverse conditions, we could not but receive a general impression of starvation and neglect. We noticed that the walls in many of the buildings were dangerously cracked and propped up by struts for the sake of safety. The students in the laboratories were so cramped that efficient work on their part seemed impossible. We were told that hot water was not laid on throughout the building and we noted that telephones and electric light were only then in process of being installed. What a contrast to the order and cleanliness and the wealth of modern resources and equipment which are so obvious in any of the medical schools attached to the great hospitals ! It is nothing short of a national disgrace that such a condition of affairs should be allowed to continue. The blame, we think, does not lie with the teaching staff, labouring as they do under the great disadvantage of inadequate salaries in a school which is both inadequately staffed and equipped. On the contrary, they have made great personal sacrifices, and have themselves provided much of the existing equipment.

20. As in the Colonial Veterinary Departments, the root of the trouble is lack of funds and a certain apathy and lack of vision. Veterinary schools in this country receive but little help from the State and have to rely mainly on students' fees. When we compare the large veterinary institutions in other countries, supported principally by State funds, with those that exist in Great Britain, the contrast is somewhat depressing. We have already referred to the large annual appropriation from Government funds in the Union of South Africa : in Germany the Veterinary College of Berlin receives an annual grant from the State of the value of £28,000. Starved as they are of financial support and cramped and confined in their activities, it is clearly impossible for the veterinary schools to give a training of the scope and quality needed. The profession must needs suffer in efficiency and prestige, and consequently in the attraction it offers as a career to the youth of the country.

21. We have found it necessary to speak strongly on this matter, because the general policy in force seems to be one of drift, and new schemes are framed merely according to available funds and not on any comprehensive plan based on a true appreciation of what is

needed. We are convinced that the problem of animal health is so important that the existing conditions both in the training institutions at home and in the Veterinary Departments of the Colonies should no longer be tolerated. In both a new policy is needed, framed on bold and comprehensive lines, supported by adequate funds, and carried through with energy and determination.

The Objective to be aimed at.

32. We propose here to set out in general terms the standard of proficiency which, in our opinion, a Colonial veterinary officer should have attained at the time of assuming his appointment.

It is imperative that he should have had a thorough grounding in science, and a good all-round scientific training, so that he may apply its principles in the solution of problems of animal disease. He should also have a sound working knowledge of animal genetics and of animal nutrition and have attended a post-graduate course of instruction in tropical veterinary science. We are satisfied that this country does not provide the training which we consider necessary. A candidate who passes one of the approved examinations before commencing his professional studies at a veterinary school need not have included any scientific subject ; so that his first acquaintance with science may be during his first year at a veterinary school.* Animal genetics and animal nutrition are but lightly touched on in the existing courses.

33. The Council of the Royal College of Veterinary Surgeons is not prepared to alter the approved syllabus of the membership course to meet the special requirements of the small numbers entering the Colonial Veterinary Services, though we understand that the lengthening of the membership course is at present under consideration. In our opinion, however, the chief deficiencies in veterinary education in Great Britain are undoubtedly connected with the facilities for teaching at most of the veterinary schools to which we have already referred. We fail to see how it is possible for students to benefit to the fullest extent from the instruction they receive, if veterinary schools are unable to supply adequate teaching staff, equipment and accommodation.

34. We find ourselves, therefore, faced with the following serious problems in regard to recruitment and training :—

- (a) That a sufficient number of men of the right personal type are not forthcoming.

* Many witnesses emphasised that, in order to avoid the cramming in pure science which is usually necessary during an undergraduate's first year at a veterinary school, there should be a pre-registration course in science which would lengthen the syllabus by one year.

- (b) That the best brains are not being encouraged to enter the Services.
- (c) That a sufficient training in general science is lacking.
- (d) That the syllabus course of Membership of the Royal College of Veterinary Surgeons does not entirely meet the requirements of officers of the Colonial Veterinary Services.

In considering how a radical improvement might be effected, we have naturally concentrated mainly on the more immediate aspect of the problem : that is to say, on how the numbers of suitable recruits can be increased and how the best training can be provided for them.

35. Our recommendations for the solution of this problem are as follows :—

RECRUITMENT.

- (1) The raising of the status and conditions of service of Colonial Veterinary Departments.
- (2) The stimulation of public interest in a Service offering opportunities for the investigation of problems of scientific interest and the exercise of responsibilities which are greater than those usually shouldered by young men.
- (3) A closer liaison with schools, university appointments boards, and veterinary colleges, so that the special requirements of the Colonial Veterinary Services may be made known to parents and students.

TRAINING.

- (1) Holders of a degree in pure science or the equivalent of Part I of the Cambridge Natural Sciences Tripos to be encouraged to enter the Colonial Veterinary Services.
- (2) Students studying for the Diploma of Membership of the Royal College of Veterinary Surgeons to be encouraged to take concurrently with it the B.V.Sc. or B.Sc.
- (3) All newly-appointed officers to undergo in this country a course of instruction in tropical veterinary science, before proceeding overseas.

Part II.—Scheme for the Provision of Scholarships.

36. We are convinced that, if the recommendations in our Report are accepted, the Colonial Veterinary Service will in due course be recognised as a first-class Service attractive to the young man of scientific bent. As a provisional measure for the increase of the number of suitable recruits and the improvement in their training, we recommend that a system of scholarships should be instituted. We must emphasise, however, the temporary nature of such an expedient. We feel that the Colonial Veterinary Service

must in the long run rely for recruits on its intrinsic attractions. Special inducements offered at an early stage to tempt young men into a profession cannot make up for inherent deficiencies in the prospects which that profession can provide in salary, status and opportunities.

We put forward a scheme for the grant of an annual number of scholarships not exceeding 10 in any one year, subject to suitable candidates presenting themselves. The scheme is designed to meet the principal difficulties with which we are faced at present. The advantages which it provides are as follows :—

- (a) It gives material assistance towards the cost of education of men who have taken a degree in pure science, and encourages them to enter the Colonial Veterinary Services ; and
- (b) It should ensure a steadier flow of candidates.

Types of Scholarships Proposed.

37. The object of the proposed scholarship scheme is to provide the Colonial Veterinary Services in the immediate future with a supply of candidates of the best personal type who have undergone a first-class scientific training. We are convinced that this object can best be attained by the following methods :—

- (1) By attracting to veterinary work men who have already received the highest training in general science at a university, and have shown a bent for scientific work.
- (2) By encouraging men who have already embarked on a veterinary training, and have shown aptitude for the work, to develop further the scientific side of their education.

We therefore recommend the following types of scholarships :—

- (a) Candidates holding a degree in pure science.—£250 a year for three years while qualifying for the Diploma of Membership of the Royal College of Veterinary Surgeons.
- (b) Candidates holding the Diploma of Membership of the Royal College of Veterinary Surgeons, and the degree of B.Sc. or B.V.Sc.—£250 a year for two years in order to take a further degree or to undertake research under the supervision of an approved teacher or at an approved institution.
- (c) Candidates who hold the Diploma of Membership of the Royal College of Veterinary Surgeons.—£250 a year for two years in order to complete a degree in some special biological subject.

Part III.—Post-Graduate Instruction in Tropical Veterinary Science.

42. Medical officers appointed to the Colonial Medical Services are normally required to take a special course of study at the London

School of Hygiene and Tropical Medicine, the Liverpool School of Tropical Medicine, or the University of Edinburgh, before taking up their appointments abroad. Instruction is given in branches of tropical medicine and hygiene, and in parasitology as applicable to public health work in this country. An officer's final selection for appointment is dependent upon the Secretary of State receiving a satisfactory report on his work and progress during the special courses of instruction.

As yet no provision is made in this country for post-graduate courses in tropical veterinary science, though we understand that the University of Liverpool contemplates the establishment of a course in veterinary hygiene which would include a certain amount of tropical veterinary medicine. The French Government, realising the importance of the teaching and study of tropical veterinary science, have instituted a four months' course obligatory for all veterinary officers desirous of working in Algeria and the French Colonies and Protectorates. At Buitenzorg, Java, in the Dutch East Indies, there is a well-equipped veterinary college in which tropical veterinary science is studied, and the problems arising from animal diseases in the tropics are seen and taught in their true environment.

43. At present the newly-appointed Colonial Veterinary Officer arrives in a British Colony with an inadequate knowledge of animal diseases peculiar to the tropics, and their treatment and prevention. We fail to see how he can be of any real practical value to his Service until he has had some specific instruction in those animal diseases which are to be met with in the Colonies. We feel strongly that without such instruction he is handicapped from the commencement of his career, and that unless he has a keen scientific interest he runs the risk of never properly mastering the first principles of tropical veterinary science. In our opinion a newly-appointed officer should not assume his normal duties in the field until he has familiarised himself with his future work by means of the following supplementary training :—

1. (a) Comprehensive courses in protozoology, entomology, and helminthology.
 - (b) More advanced work in pathology, bacteriology, and biochemistry.
 - (c) Courses in animal nutrition, animal genetics, tropical hygiene, and tropical agriculture.
 - (d) The application of these sciences to specific problems of animal disease and epizootiology.
2. Training, chiefly practical, at a laboratory in which tropical

diseases of animals can be seen under circumstances approximating more nearly to normal conditions.

44. The special courses referred to under (1) could most easily and economically be arranged in Great Britain. But the second and practical portion of the training could be satisfactorily given only in a tropical country. It would be of undoubted advantage if all newly-appointed officers could receive clinical instruction at some well-equipped centre abroad, in order to complete their initial training before assuming their normal duties. We fear that this is impossible in view of the vast extent of the Colonial Empire. We recommend, however, that if the Colony to which an officer is posted has a veterinary laboratory he should receive a course of instruction of about three months' duration before proceeding to his up-country station. Where no veterinary laboratory exists, he should if possible be sent for such training to a neighbouring Colony possessing the necessary facilities.

School of Tropical Veterinary Science.

45. We are of opinion that there is no institution in this country which at present offers the facilities which we deem to be necessary for the special requirements of the Colonial Veterinary Services. We therefore recommend that a School of Tropical Veterinary Science should be established, modelled on the lines of the London School of Tropical Medicine.

SITUATION.

46. We do not make any definite recommendations regarding the actual site of the School of Tropical Veterinary Science which we propose, *but in our opinion two important principles must govern its establishment :—*

1. *It should be closely linked with a veterinary college.*
2. *It should be affiliated to a university so as to be eligible for a grant from the University Grants Committee.*

We understand that suitable accommodation might be made available either at the Research Institute of the Royal Veterinary College, Camden Town, London, or in the premises of the Seamen's Hospital, Endsleigh Gardens, London, formerly occupied by the London School of Tropical Medicine. If these two principles are accepted, we see no reason why the proposed school should not be established at either of these places ; and we urge the importance of an early decision being taken so as to secure the lease of one of these sites.

47. To obtain the necessary status for recognition as a school of a university, the new School of Tropical Veterinary Science must be properly organised in the arrangement of its departments and be

staffed by men whose ability to teach their particular subjects is unquestionable.

The curriculum of the school should provide :—

- (a) A post-graduate course in tropical veterinary science of about six months' duration for all newly-appointed Colonial veterinary officers, whose final selection for appointment would depend upon the Secretary of State for the Colonies obtaining a satisfactory report on their work and progress.
- (b) Refresher courses for Colonial veterinary officers on leave.
- (c) Facilities for research.

We have explored the feasibility of the post-graduate and study-leave courses being undertaken at different periods of the year, so that the teaching staff may be utilised in the most economical way. We understand that students from the veterinary schools graduate annually in July, and we therefore propose that the ordinary post-graduate courses should commence annually in October and terminate in March. The four months—April to July—could then be devoted to the proposed refresher courses.

STAFF AND DEPARTMENTS.

48. We recommend—

1. That the following establishment should be regarded as a minimum for the new School of Tropical Veterinary Science :

Permanent Staff : Director, Three Senior Officers.

Temporary Staff (part-time) : Demonstrators.

Visiting Staff : Lecturers.

2. That the School should be divided into the following three main departments :—

(1) Bacteriology and Pathology ; (2) Parasitology, including Entomology ; (3) Physiology and Nutrition ; each under a senior whole-time officer.

49. The Director should be the administrative head of the School, concerned primarily with its organisation and development. It would be desirable that his teaching duties should be confined to lectures on veterinary hygiene, and to clinical demonstrations in not more than one major subject. But we fear that the minimum staff with which it is proposed to furnish him would necessitate his taking, at any rate at first, a more active part in teaching in the School. We therefore suggest that until an expansion of staff is possible he should give special instruction in the application of bacteriology, parasitology, and entomology to tropical veterinary science. By so doing he would keep in close touch with the methods of instruction in the three departments and at the same time watch the progress of individual students.

50. It is essential that the School should be kept in the closest

possible touch with the Central Research Station, whose establishment we recommend in Part V of our Report. It will be appreciated that many of the problems with which both these new institutions will be faced may be identical and in any case closely allied. In our opinion the necessary co-operation could best be effected by a periodic interchange of staff. We see no reason why such a liaison between the two institutions should not be established and work smoothly and beneficially.

51. The Imperial Agricultural Research Conference, 1927, recommended in their Report* the establishment of a Bureau of Animal Health in London as a clearing-house of information on veterinary science throughout the British Empire. It is essential that the School should be in close proximity and touch with this Bureau when established, and in our opinion this could best be achieved if the Director of the School were a member of the technical advisory council of the Bureau of Animal Health.

SALARIES.

52. We recommend that the salaries of the permanent staff should be as follows :—

	£	£
Director	1,250	1,250
Three Senior Officers ..	1,000	3,000
Total		<u>£4,250</u>

We estimate that the annual expenditure in connection with the salaries of temporary and visiting staff should not exceed £2,000.

FINANCE.

53. We estimate that the capital outlay necessary for the conversion of an existing institution into a School of Tropical Veterinary Science will be about £3,000 to £5,000 and that the current expenditure including salaries, rent, maintenance, etc., will be about £12,000 per annum.

Part IV.—Headquarters Organisation.

55. There is at present no advisory authority to the Secretary of State for the Colonies on veterinary matters, as there is on legal, medical, and, we understand, there will shortly be on agricultural matters. Questions affecting the personnel, organisation, and policy of Colonial Veterinary Departments are therefore dealt with without the advice or assistance of any technically qualified officer.

This is a most unsatisfactory situation and we consider that it should be remedied forthwith. We suggest that the following measures should be taken :—

A.—An Adviser on Animal Health to the Secretary of State for the Colonies should be appointed.

B.—A consultative Committee of Animal Health, representing the various branches of veterinary science, should be established.

C.—When the Agricultural Committee proposed by the Colonial Agricultural Service Organisation Committee is set up, a joint body representative of both Agricultural and Veterinary interests should be established (the Colonial Advisory Council of Agriculture and Animal Health) to ensure that questions of policy and research affecting both spheres of scientific action are properly co-ordinated.

A.—Adviser on Animal Health.

56. The Adviser on Animal Health should be a distinguished veterinarian possessed of organising capacity and familiar with conditions existing in the Colonial Empire.

The duties attaching to this post should be more particularly as follows :—

- (1) To advise the Secretary of State generally on all veterinary matters in the Colonies. (For this purpose he should have access to all necessary departmental documents, etc.)
- (2) To ensure, so far as is possible, continuity of policy, co-ordination of action between different administrations, and the introduction of new ideas in the work of the Colonial Veterinary Services.
- (3) To maintain a personal liaison and co-operation with other Government Departments in the United Kingdom and with other bodies in relation to veterinary work in the Colonies, to keep in touch with the Council of the Royal College of Veterinary Surgeons, with the veterinary schools in the United Kingdom, and with the proposed School of Tropical Veterinary Science.
- (4) To officiate as Deputy Chairman of the Committee of Animal Health and to be a member of the Colonial Advisory Council of Agriculture and Animal Health.
- (5) To advise the Secretary of State on all questions relating to the personnel of the Colonial Veterinary Services.
- (6) To assist the Private Secretary (Appointments) in the interviewing of candidates who are under consideration in connection with vacancies in the Colonial Service and to supervise the working of the Scholarship Scheme referred to in Part II of our Report.
- (7) To advise on all changes in the regulations for, and conditions of the employment of Colonial Veterinary Officers.

- (8) To keep in close touch with the activities of Veterinary Departments by means of periodical visits to the Colonies.

It is our intention that the post should be of an advisory character with no direct executive functions and should in no way affect the responsibility of a Governor or Head of a Veterinary Department in regard to the administration of veterinary matters in any particular Colony.

SALARY AND STAFF OF THE ADVISER ON ANIMAL HEALTH.

57. We recommend that the salary of the Adviser on Animal Health should be £1,500 per annum and that, as in the case of the Chief Medical Adviser, this sum should be borne by the Exchequer. As regards personal staff, we recommend that, as a temporary measure, he should have a call on the services of the Principal seconded from the Colonial Office, whose appointment was recommended by the Colonial Agricultural Service Organisation Committee.* Shorthand writers should be available for his use from the Colonial Office pool.

B.—Constitution of the Committee of Animal Health.

58. We recommend that the Committee of Animal Health should be composed as follows :—

The lay Chairman of the Colonial Advisory Council of Agriculture and Animal Health, referred to in paragraph 60 of our Report.

The Adviser on Animal Health (Deputy-Chairman), the Chief Agricultural Adviser, a representative of the permanent staff of the Colonial Office, a Bio-Chemist, an Economic Botanist, an Entomologist, a Parasitologist, a Protozoologist, an Animal Pathologist, a Specialist in Animal Nutrition, an Animal Geneticist, an Epizootiologist.

FUNCTIONS OF THE COMMITTEE OF ANIMAL HEALTH.

59. We recommend that the functions of the Committee should be to advise on the following matters :—

- (1) The main veterinary research policy of the Colonial Empire.
- (2) The supply of specialist and field officers for the Colonial Veterinary Services, in conjunction with the recruiting authorities of the Colonial Office.
- (3) The arrangements for training, including the working of the scholarship scheme, and for post-graduate training and study leave.
- (4) The efficiency and general well-being of the unified Colonial Veterinary Service, the creation of which we recommend in Part VII of our Report, including such advice upon the

* Cmd. 3049, paragraph 18.

Veterinary Services as the Secretary of State or Colonial Governments may desire.

- (5) The establishment of the Central Research Station which we recommend in Part V of our Report, and the general guidance of its work.
- (6) The collection, collation, and distribution of veterinary information in fields not covered by other agencies.
- (7) The representation of the Colonial Empire as a unit in Imperial schemes of research and in Imperial Bureaux and Correspondence Centres.

This definition must, however, be regarded as only tentative since an exact appreciation of actual requirements can only be evolved by experience.

C.—Colonial Advisory Council of Agriculture and Animal Health.

60. In view of the close inter-dependence of animal health and agriculture, we took the opportunity of discussing with the Colonial Agricultural Service Organisation Committee the steps which should be taken to secure the necessary co-operation between the two Services and to ensure that the whole field of veterinary and agricultural activities is covered and that no gaps are left between the fields of activity which are at present the concern of two separate Departments in most Colonies.

We were informed that the Colonial Agricultural Service Organisation Committee proposed to recommend the establishment of a Colonial Agricultural Council. Many of its members would be the same as those of the Committee of Animal Health. We discussed with the Colonial Agricultural Service Organisation Committee the question of the formation of a single Joint Council to advise on questions of common interest to veterinary science and agriculture. We were unanimous in agreeing that a Joint Council would be in the best interests of both, and recommend that a Colonial Advisory Council of Agriculture and Animal Health should be established and that it should be composed of the following members :—

Chairman (who should be a Layman), the Chief Agricultural Adviser to the Secretary of State, the Adviser on Animal Health, the Assistant Agricultural Adviser, the Chief Medical Adviser to the Secretary of State for the Colonies, a representative of the permanent staff of the Colonial Office, the Director of the Imperial Institute, an Agriculturalist with tropical experience, a Botanist, an Entomologist, a Mycologist, an Animal Geneticist, a Specialist in Animal Nutrition, a Chemist, primarily for soil science, an Epizootiologist.

It will be seen that the members of the Committee of Animal Health will for the most part be members also of the Council. We anticipate that in practice this Joint Council will not find it necessary to meet very often and that the main work will fall upon the Committee of Animal Health, and upon the Agricultural Committee respectively.

ACCOMMODATION.

61. We have considered the question of accommodation for the Joint Council and for the Committee of Animal Health and are of opinion that it would be preferable if both could be housed in the Colonial Office. We understand, however, that owing to the congestion in that Office this is impracticable. We suggest that if the Office of the Bureau of Animal Health, to which we have referred in Part III, paragraph 51, of our Report, is established in London, as was recommended by the Imperial Agricultural Research Conference, 1927,* the Committee of Animal Health should if possible be given accommodation in the Office of the Bureau. We agree with the recommendation of the Colonial Agricultural Service Organisation Committee that the Colonial Advisory Council of Agriculture and Animal Health should sit at the Imperial Institute.

62. We are convinced that it is essential that the Adviser on Animal Health should be accommodated in the Colonial Office, as we consider it of the utmost importance that he should establish close personal relations with the staff of the Colonial Office and be readily accessible for consultation in that office. Equally important is the maintenance of close relationship between the authorities at home and the officers serving in the Colonial Empire, and in this connection we fully endorse the views expressed by the Committee on Agricultural Research and Administration in the Non-Self-Governing Dependencies in paragraph 112 of their Report† and by the Committee of the Colonial Office Conference, 1927, in paragraph 26 of their Report‡, to the effect that not only should the Adviser and other members of the Council acquire as much knowledge as possible both of individual officers in the Colonies and of the conditions under which the latter have to work, but also governors, chief veterinary officers, and other senior officers should be brought into touch with the Council and Committee when on leave in this country, and should be invited to attend their meetings and to take part in the discussions.

Part V.—Organization of Research.

63. We are impressed by the valuable research work which is being performed by officers in the Colonial Veterinary Departments. We are unable, however, to find any co-ordinate plan of action against

* Non-Parliamentary Publication, March, 1928.

† Cmd. 2825, page 48.

‡ Cmd. 2883, page 32.

animal diseases. It appears to us that there is much duplication of research and that the individual results of a worker in one Colony are not necessarily known to his colleagues working on the same problem in other territories. Specialist officers, whose numbers we consider very small in proportion to the need, are required to devote an inordinate amount of their time to the preparation of sera and vaccines and other routine duties.

It is clear that in most of the larger Colonies there is great need for augmentation of research staff and for the provision of funds adequate to the work required. We stress the importance of salaries of the higher research posts being such that the ambitious and able research worker will not be tempted for financial reasons to transfer to the administrative side, and consequently to undertake duties of which he has probably little experience, and for which he may possess little aptitude. On the other hand, the division between the two branches of the Service should not be rigid and transfers from one side to the other, when prompted by the consideration of an officer's taste and aptitude, should be encouraged in the interests of efficiency.

Whilst we strongly recommend the strengthening and extension of local research organizations, we feel that something more than this is needed. It is in the highest degree desirable that the work of such organizations should be co-ordinated so far as possible, but each local organization must necessarily attempt first to meet the most urgent needs of the particular Colony in which it is situated. In most cases the local Service is unlikely to include specialists in all the main branches of veterinary science. It has to be remembered that some problems are of considerable importance to many different Colonies and some even to the whole Colonial Empire. In many cases these problems present aspects which obviously call for prolonged and intensive study, whilst they may be of such a nature as to demand the combined efforts of a number of specialists in different branches. Such problems are likely to receive adequate attention only in a large and well-organized institution which is to some extent independent of urgent local calls on its time and attention.

We are in entire agreement with the recommendations of the Imperial Agricultural Research Conference*, who laid down that Central research stations "should, in the main, confine themselves to 'long range' and 'wide range' research, i.e. that they should concentrate on—

- " (a) problems requiring more prolonged research work than could normally be expected from the technical staff of any single administrative department ;

* Non-Parliamentary Publication, March, 1928, page 9.

“(b) problems arising in more than one territory of the Empire, towards the solution of which the comparative method may be expected to make an effective contribution.”

Establishment of a Central Research Station.

64. We recommend that a central research station should be established in the tropics, preferably in East Africa, as the pivot organization for veterinary research in the Colonial Empire. We consider it important that the central research station should not be unduly affected by local administrative considerations. In this connection we wish to lay stress on the importance of the closest touch being maintained between the central research station and the ordinary veterinary activities including veterinary research of the Colony in which it is situated. The work of this station should be regarded as a reinforcement to that of the local Veterinary Department and in no sense as the substitute for it.

STAFFING OF CENTRAL RESEARCH STATION.

66. We consider that the following establishment should be regarded as a minimum for the central research station :—

Director, three senior research officers, four junior research officers, secretary-librarian, recorder, farm manager, accountant store-keeper, four laboratory assistants, engineer mechanic.

We have made no provision for the appointment of a deputy director. If funds permitted, such an appointment would be desirable, but in the meantime we recommend that one of the senior research officers should be at the same time deputy director.

67. We recommend that the station should be divided into three main departments :—

- (1) *Pathology*, including morbid anatomy, bacteriology, immunology.
- (2) *Physiology*, including nutrition, biochemistry, toxicology.
- (3) *Parasitology*, including mycology, protozoology, entomology, helminthology.

A senior research officer should be in charge of each department, assisted by a junior officer who should understudy him in the event of absence. We contemplate that the director and other officers should travel when necessary in order to keep the central research station in close touch with important investigations elsewhere and with veterinary activities.

Salaries.

68. In framing our recommendations for the salaries of the officers of the central research station, we have adopted the scales proposed for the unified Colonial Veterinary Service, the creation

of which we recommend in Part VII of our Report.* For present purposes we have placed the director in Class II, one senior Officer in Class IV and two in Class V, and the four junior officers in Class VI, and in each case we have based our estimate on the mean of the scale.

We recommend that the salaries should accordingly be as follows :—

	£	£
Director, Class II	1,500-50-2,000	1,750†
1 Senior Officer, Class IV ..	1,200-50-1,350	1,275†
2 Senior Officers, Class V ..	1,000-50-1,200	2,200†
4 Junior Officers, Class VI ..	750-50-1,000	3,500†
Total		<u>£8,725</u>

As regards the other officers whose appointments we have recommended, we suggest that the following scales of salaries should be sufficient to attract officers of the qualifications desired :—

	£
Secretary-Librarian	700-30-900
Recorder	450-25-600
Laboratory Assistants	480-20-600
Farm Manager	500-25-750
Accountant Storekeeper	350-15-400
Engineer Mechanic	400

RELATIONS WITH COLONIAL VETERINARY DEPARTMENTS.

59. We have already referred to the need of securing close co-operation between the central research station and the Veterinary Departments, and the visits which we have suggested should be paid to Colonies by the director and other officers of the station will assist in maintaining close personal relations. We see no reason to anticipate that any serious difficulty will, in fact, arise, but we have carefully considered whether any rules should be laid down to govern the relations between the central research station and the Veterinary Departments. We have come to the conclusion that the rules which were suggested in paragraph 95 of the Report‡ of the Committee on Agricultural Research and Administration in the Non-Self-Governing Dependencies might be modified for the Veterinary Service to read as follows :—

" (1) An officer from the central station should not proceed with any outside investigation without information of his intention being given, in advance of his visit, to the Governor of the territory concerned.

" (2) If the Governor, after obtaining the views of the chief veterinary officer, informs the director of the central

* Page 37.

† Mean of the Scale.

‡ Cmd. 2825, page 42.

research station of any objection to the proposed investigation, the matter should be referred to the Council in London before any decision is taken.

- " (3) An officer despatched for the investigation in a particular territory of a subject which directly concerns the Veterinary Department should, where possible, be placed under the executive control of the chief veterinary officer."

FINANCE.

70. We are unable to estimate the capital outlay necessary for the establishment of the new central research station. We understand that the cost of developing the Veterinary Institute at Kabete, Kenya Colony, involved a capital expenditure of about £45,000 and that its recurrent expenditure amounts to about £30,000 per annum. We anticipate that the new central research station will not be represented in its earlier stages by such a completely-equipped institute as that at Kabete and that its growth will be gradual. We estimate that the recurrent expenditure of the new central research station, including cost of salaries, maintenance, etc., will not fall short of £25,000 per annum.

Part VI.—Colonial Veterinary Departments. Observations on their Organization and Conditions of Service.

72. Most of the Colonies have Veterinary Departments of varying size. The staff of a department usually consists of a chief veterinary officer, assisted by a fairly large proportion of administrative or field officers, and a small proportion of research officers. In Kenya a chief veterinary officer is in charge of the administrative and executive division and a chief veterinary research officer in charge of the research division. The total number of qualified veterinary officers in the Colonial Services is 127, of whom 112 are field and 15 research officers.

Independence of the Veterinary Department.

73. We note that the Committee appointed by your predecessor, the late Viscount Milner, in 1920, to consider the staffing of the Veterinary Departments in the Colonies and Protectorates recorded* that in nearly all the Colonies and Protectorates the Veterinary Departments were branches of the Agricultural Departments, and recommended that in future veterinary work should be regarded as distinct, and that the veterinary interests of the non-self-governing Dependencies should be entrusted to separate Veterinary Departments. We find, however, that in some of the larger Colonies the Veterinary Department still forms part of another Department, usually the Agricultural Department, and, in the case of Malaya,

* See Cmd. 922.

the Medical Department. On the question of the independence of the Veterinary Department we were informed that, if the Veterinary Department is not autonomous, veterinary matters may not be properly represented direct to the Government, and that the Department to which the Veterinary Service is ancillary is liable to neglect the veterinary point of view and also starve the Veterinary Service of funds necessary for its advancement. On the other hand, it was suggested to us that, provided the Director of the Department in which the Veterinary Service is incorporated possesses adequate experience and breadth of vision, a joint Veterinary and Agricultural Department, by virtue of the close relationship of these sciences, is a definite advantage.

74. We have considered how far it was possible to define the functions as between Agricultural and Veterinary Departments, and in our opinion no precise definition is possible or desirable. We feel, however, that, whilst the Veterinary Services deal mainly with questions affecting animals in ill-health, any such limitations of its functions would be impossible, and that questions with which the Veterinary and Agricultural Services are equally concerned would have to be examined and dealt with by either or both of the Departments, in accordance with local circumstances and requirements. *We strongly recommend, however, that there should be a separate Veterinary Department under its own professional head in all but the very smallest Colonies.*

Status of the Veterinary Department.

75. We believe that a veterinary officer labours from the start of his career in the Colonial Service under difficulties which his colleagues in other departments do not encounter. He arrives in the Colony to which he is posted inadequately trained, and it is only occasionally that he has the advantage of a short period at headquarters where he may gain some useful experience in the more immediate problems which he will have to solve later. Usually he is posted, soon after arrival, to a district perhaps remote from his headquarters, where he must play a lone hand and assume enormous responsibilities in the control of large areas and the treatment of animals in the mass. His work is usually carried out under the greatest difficulties and, however excellent, its results probably do not mark him out for the recognition which scientific workers in other branches of the Colonial Services may receive. The creation of a unified Veterinary Service which we recommend in Part VII of our Report provides for the veterinary officer of proved ability being adequately rewarded for his work as a member of a scientific department.

76. The isolated status of the individual officer appears to be reflected in his department, which is not regarded, as it should be, as one of the links in the chain of scientific departments in a Colony. *Despite the great disadvantages to which they have hitherto been subject, we wish to record our admiration for the work which the Colonial Veterinary Services have performed under grave difficulties and adverse conditions. We are convinced that a raising of the general status of the Department is necessary, so that its officers may carry out their duties with the knowledge that they are receiving the full recognition which falls to other scientific workers.*

We feel that the term " Veterinary Department " does not properly describe the duties and functions which its officers are called on to perform. A narrow conception has been taken in the past of veterinary science, *which should include all matters relating to the preservation of the domestic animal in the normal state or in the state of health. Whilst the veterinary officer will primarily be concerned with the sick animal, he must necessarily be interested in all the questions relating to animal health.* We believe that it is possible that in the future veterinary work may become more a matter of directing the care of animals which are healthy to keep them so. Activities in veterinary science in the Colonial Empire cover a far wider and more interesting field than is to be met elsewhere and we fear that the ignorance of the duties performed by an officer in the Colonial Veterinary Services may tend to deter the very type of man which we are anxious to recruit into the Service.

Proposed Colonial Departments of Animal Health.

77. We therefore recommend that the existing title of " Veterinary Department " should be replaced by the title of " Department of Animal Health." We also recommend that a Department of Animal Health in a Colony should include :—

- (a) *Headquarters* with a Veterinarian Director who should advise the Government on all questions of animal health and control.
- (b) *Research Staff*, consisting of a Chief Research Officer assisted by veterinary workers with research training, and by such other scientific workers as may be found necessary.
- (c) *Field Staff*, consisting of District Veterinary Officers whose duties would be chiefly to attempt to suppress contagious diseases and to deal with the health of animals generally.

We appreciate that such an establishment would be beyond the financial powers of the smaller Colonies, but in our judgment such an organization should be aimed at.

Junior Officer as Sole Member of a Veterinary Department.

78. We understand that a junior veterinary officer is sometimes appointed to a Colony as sole representative of its Veterinary Department. We consider that such a course, in the interests both of the Colony to which he is appointed and of the officer himself, is undesirable. The creation of a unified Veterinary Service which we recommend in Part VII of our Report will obviate such a practice.

Study Leave.

79. We are of opinion that the provision of adequate study leave for officers of the Colonial Veterinary Departments is of the utmost importance. It should be a normal condition of an officer's appointment and should be granted regularly after a fixed period of service. Study leave should not involve sacrifice of pay or leave. An officer should be assisted with books and equipment and the staff of his Veterinary Department should be sufficient to allow such leave to be taken without causing inconvenience or a grievous shortage of officers remaining on duty.

There are two broad divisions of study leave :—

- (a) Refresher courses, which should be taken by the majority of officers.
- (b) Individual courses of study at a centre or centres where facilities exist for the study of particular problems or particular branches of work.

It is essential that officers should have opportunities of keeping in touch with the latest development of veterinary science, and with other workers. The Adviser on Animal Health, being resident in this country and being in close touch with scientific developments and institutions, has an opportunity, which others abroad cannot have, of knowing what courses of instruction are best suited to individual needs. We therefore recommend that he should be consulted in respect of all officers proceeding on study leave, so that he may have timely notice to arrange for their attendance at any particular course of study.

Part VII.—A Colonial Veterinary Service.

80. The veterinarian of the highest ability will enter the Colonial Services only if he is offered a career sufficiently attractive in pay and prospects to satisfy his ambitions as a scientific worker. His work should not necessarily be limited to any particular Colony : he should, as it were, be on a roster of workers liable to be summoned to any part of the Colonial Empire, to assist by the experience which he has already gained in the solution of a given problem, at the same time increasing his own experience. Colonial Veterinary Departments as at present constituted are to a large extent in watertight compart-

ments. Transfer from the service of one Colony to another is the exception rather than the rule, and an officer posted to a Colony normally expects to remain there throughout his service.

81. As regards salaries, we consider that the initial salary of £600 per annum is adequate and compares favourably with that paid in the other scientific departments. In our opinion salaries obtained during his passage through a "long scale"* (such as those in existence in the Tropical African Colonies and in Malaya) are sufficiently remunerative for an officer of average ability. After reaching the maximum of the scale a few fortunate officers may be appointed to Directorships of Veterinary Departments, *but even so the salary attaching to these posts is in most cases inadequate compensation for the services of a first-class man. An officer of approved ability should not be allowed to remain unrewarded either before reaching or when he has reached the top of his scale of salary. His advancement should not be retarded, but should be accelerated, with adequate financial compensation.* Under the conditions of service as they exist to-day he realises that on reaching the top of the "long scale" the Colonial Service has little more to offer him in pay and prospects.

82. One of the questions considered by the Colonial Office Conference, 1927,† was that of the interchange and transfer of officers in the Colonial Services. Special attention was drawn to the disabilities which arise owing to the fact that there is no single Colonial Service, and the suggestion was made that a single Service should be created for each of the technical services. The Committee which was appointed to frame and submit a scheme for the creation of a Colonial Scientific and Research Service recommended that the principle and creation of such a service should be approved. The Colonial Agricultural Service Organisation Committee recommended in their Report‡ the creation of a unified Agricultural Service, to include a proportion both of specialist and of agricultural officers now serving in the Colonial Agricultural Departments.

We have considered the possible application of this recommendation to the Colonial Veterinary Services and are of opinion that unification is ultimately desirable. In our opinion mutual benefit would accrue between the larger and smaller Colonies: A single Service would tend to blend veterinary work throughout the Colonial Empire by the free interchange of its workers. We have referred in Part VI, paragraph 78, of our Report to the posting of a junior officer to a Colony as the sole member of its Veterinary Department. Obvious difficulties militate against securing the services of a suitable candidate

* or "time scale," i.e. the scale providing continuous increments over a period of 15 to 20 years, subject to efficiency bars at certain points: see Appendix II.

† Cmd. 2883, page 17.

‡ Cmd. 3049, page 24.

for such a post. The keen young veterinarian often sees himself side-tracked for life in a Colony with the smallest prospects of promotion or transfer ; and so that Veterinary Department is frequently represented by a man of inferior attainments who drifts through his service without giving any material assistance to the development of veterinary science in the Colony to which he has been posted.

83. We consider that it would be distinctly helpful to recruiting if a unified Service could be created at the same time as the arrangements which we have recommended in regard to training and research are carried out. But we recognise that the latter are more urgent than anything else at this moment. We appreciate therefore that the inception of a unified Service may have to be deferred until our other proposals have been carried into effect, but we urge that Colonial Governments should be invited to accept the principle of its ultimate creation.

84. In a unified Service junior officers should receive their initial experience in one of the larger Veterinary Departments. The demands of the smaller Colonies should be met by the posting for a short tour of service of an officer whose experience in the larger Colonies would fit him to take his place as sole representative of the Veterinary Department. Although a junior officer, he would be experienced and therefore able to shoulder great responsibilities ; he would be required to exercise his abilities both as an organizer and as an administrator. Whilst the smaller Colony will thus obtain the services of a properly trained officer, the Colony to which he is subsequently transferred will receive an officer who has benefited by the experience of acting as the representative of a Veterinary Department for whose welfare he was entirely responsible.

85. Accordingly we do definitely recommend the creation of a unified Service in which both specialists and field officers should be included, graded in classes at the following scales of salary :—

Class I	..	..	..	..	£2,000—£50—£3,000
Class II	..	..	..	..	£1,500—£50—£2,000
Class III	..	..	..	..	£1,350—£50—£1,500
Class IV	..	..	..	..	£1,200—£50—£1,350
Class V	..	..	..	..	£1,000—£50—£1,200
Class VI	..	..	..	..	£750—£50—£1,000
Class VII	..	..	..	..	£600—£30—£750

We propose that the salaries should be basic rates, common to the whole Service in whatever Colony the officer is employed. Since, however, a unified Service implies the liability to transfer we propose that local compensation allowances should also be paid in certain Colonies, as was recommended by the Committee of the Colonial Office Conference, 1927, in paragraph 62 (b) of their Report,* in order

* Cmd. 2883, page 37.

to safeguard an officer against any direct loss on transfer to a post where conditions are less favourable, e.g. owing to climatic conditions or to the cost of living.

86. In certain Colonies local allowances are already given, e.g. in West Africa and Malaya, and these might serve as a basis upon which a complete system can be evolved. We recommend that the proposed Joint Council should consider this question with a view to the matter being taken up with the Colonial Governments concerned at as early a date as possible.

Finance.

89. We feel sure that those Governments in which the veterinary interest is of paramount importance will be prepared to subscribe to the extra financial burden which our recommendations would entail. It is, however, in those Colonies in which the veterinary interest is not of such importance—Colonies staffed in some cases by a single veterinary officer, in which salaries are usually small, sometimes as low as £375 per annum—that the greatest difficulties in connection with recruitment are experienced. *From the evidence which we have received we are convinced that, if Colonial Governments are not prepared to make veterinary officers eligible to receive the rates of salaries which we recommend, they will be unable to fill their veterinary vacancies with properly qualified candidates.* It should be realised that in those Colonies in which there is a sole member of the Veterinary Department the salary of an officer of the single Service appointed for a tour of duty would probably amount to about £700 per annum. In our opinion the excess over the usual salary paid by the Colony would be amply compensated by the officer's ability, training, and experience, and the reliance which the Colonial Government could place in him. We visualise the possibility of a smaller Colony being suddenly faced with an outbreak of animal disease which it has hitherto not experienced and which seriously affects its prosperity. A single Service places at its disposal scientific workers of the highest ability who could be temporarily employed to deal with the problems connected with the outbreak.

Final Remarks.

90. *In conclusion we confidently trust that Colonial Governments will accept our recommendations as being the only practical solution of the serious difficulties of finding suitable recruits to fill their vacancies, and of steadily raising the scientific standard of veterinarians in the public service in the Colonial Empire. The measures which we have suggested should ultimately build up a scientific Service of highly-trained veterinary workers, capable of dealing with the many problems of animal health which most seriously affect the general welfare and prosperity.*

Clinical Articles

A Celosomian Monstrosity.

By R. E. ALEXANDER, M.R.C.V.S.,
Weymouth.

I WAS recently summoned to attend a cow suffering from difficult parturition. The owner, when I arrived, told me he had done his best, but that it was "beyond him." As he is a man of some experience, I quickly foresaw that I was due to encounter something interesting.

On exploring the vaginal passage, I met with the head, upside down, and a confusing tangle of legs and feet. All four feet were round the head.

Attaching cords to all four feet, and anxiously sorting out the forelimbs, I pushed the whole mass back into the uterus. Keeping the forelegs well drawn forward, I hopefully sought to push the hind legs back. It was impossible, they were immovable.

I retained sufficient text-book knowledge to know that I had probably struck an anterior presentation of a Celosomian monstrosity, and that the case was rather desperate. The treatment usually advised, viz. to remove the limbs, head, ribs, etc., seemed a formidable undertaking. I finally decided upon traction, and the flower of the local manhood from the village pulled upon the limbs and head collectively.

With surprisingly little pulling, the assembly suddenly came out like a cork out of a bottle. The gentlemen supplying the power, on seeing the entrails exposed, optimistically concluded they had pulled the calf in twain. The monstrosity was standard in every way, with the limbs appearing to sprout from behind the head; numerous duplicate folds of skin, exposed intestines; and it was especially curious to see the uncovered heart beating in the light of day.

As regards the patient, no injury was caused to the passage, as she was a roomy cow. The uterus itself was very flaccid and strained. Recovery was uneventful.

Perhaps it was a case of "fools rushing in where angels fear to tread," but I think if it is possible, traction is superior to an exhausting embryotomy.

Hæmorrhagic Septicæmia in Bovines.

By WILLIAM TWEED, M.R.C.V.S., D.V.S.M.,
Sheffield.

THIS is a disease which has caused some controversy as to whether it occurs to any extent in bovines in this country and whether the

pectoral or exanthematous form is the more common type met with.

In America both types of the disease occur. Bacteriological investigations have been made and in an article by F. S. Jones on the study of *B. Bovi Septicus*⁽¹⁾ he describes a group of similar outbreaks of the pectoral form to those described by Sampson and myself⁽²⁾ which occurred in a district near Sheffield. The symptoms described by Jones were similar to those seen by us.

Dr. Edington, of the Sheffield University, isolated *B. Bovi Septicus* in pure culture from the lung lesions, but at the time these outbreaks occurred, unfortunately, inoculation experiments into bovine animals with these freshly cultivated organisms was not possible, and he found inoculation of the small laboratory animals was not satisfactory to test their pathogenicity. The difference in the pathogenicity of some strains to infect small laboratory animals was also noted by Jones.⁽³⁾

However, it has been arranged that calves or other bovine animals be obtained and inoculated if an outbreak occurs later; these animals to be inoculated with a fresh emulsion of the *B. Bovi Septicus* and others with a filtrate obtained by filtration of the lung juices through a suitable filter. In this way the possibility of a filter-passing organism being the primary cause of the disease could be proved or disproved, whilst the *B. Bovi Septicus* would also be tested for its possible pathogenicity. The fact, however, of a large number of this organism being present and the growth of a pure culture points to *Bac Bovi Septicus* as the possible cause of the disease.

The outbreaks in bovines mentioned above⁽²⁾ were of the pectoral type and occurred on farms in the same district, but several miles apart. Some of the first animals affected in the herds were animals which had been purchased in markets a short time previously, and had been brought home and stalled in sheds adjacent to animals which subsequently become affected, thus pointing to exposure in markets or journeys from sales being a predisposing cause. The adjacent animals becoming affected points to its infectious nature, although in other outbreaks no such history was available, the disease being entirely sporadic in origin.

The symptoms shown in the pectoral form met with in these cases were rapid breathing, dry painful cough, loss of appetite, high temperature up to 107° F., grunting and a profuse dirty serous and slightly blood-stained nasal discharge which was a characteristic symptom of the disease.

The cases lingered on for a few days with very acute symptoms, and in those which recovered the symptoms gradually subsided into those of pneumonia, with dullness over the affected areas in the lungs,

bronchial breathing and vesicular rales. The fatal cases died after three or four days' illness.

Post-mortem examination of animals in the acute stages showed lesions very similar and characteristic. The areas of consolidation appeared as bright red coloured areas. This colour was most marked in all the cases.

When an incision was made through the entire lung, the interlobular tissue was found to be very cedematous and swollen, which gave the lungs a lobulated appearance somewhat resembling contagious pleuro-pneumonia.

The consolidated areas were very hæmorrhagic and blood-stained serous fluid exuded from the cut surface. On microscopical examination of this fluid a large number of bipolar bacilli could be seen. In the less acute cases small greyish caseous areas were found in the lungs. The lymph glands of the carcass were congested and petechial hæmorrhages were present on the serous surfaces.

It is hoped if future outbreaks occur that inoculation and vaccination experiments of bovine animals will be carried out.

(1) *Journal of Experimental Medicine*, Vol. xxxiv., pp. 561-577.

(2) V.R. No. 12. Vol. viii., p. 235.

Laparotomy Through the Inferior Abdominal Wall in a Fifteen Months Old Bovine.

By O. STINSON, M.R.C.V.S.,

Appleby.

SOME weeks ago I was requested to attend a bullock late at night. It had been castrated by the farmer during the afternoon of that day, as he had decided that the animal was not good enough for stud purposes. He was 15 months old and big for his age. On arriving at the farm I found that he was tied up by the legs and on his back, being held there by half a dozen men. An enormous mass of cedematous bowels was in evidence resting on the abdomen. They were cold and almost black—not to mention the filthy condition. It was evident that it would be impossible to return them to the abdomen, as only two fingers could be introduced through the internal inguinal ring; nevertheless, the ring was enlarged in the forward direction. This, it was plain to see, could not help things further. The possibility of getting the intestines back if they could be gently pulled in from the inside with assistance from the outside was considered. Laparotomy was performed, the patient from the beginning being under deep chloroform anæsthesia. The incision was a little to that particular side of the middle line, and extended forward from about 2½ inches

in front of the inguinal ring incision, for about 8 inches. The left arm was introduced into the abdomen through this incision, and the intestines were finally got into the abdominal cavity by traction with the left hand from the inside and by careful assistance from the outside by the right. The internal ring was sutured with "continuous" sutures, as also was the parietal peritoneum and other structures, except the skin of the incision further forward. Very strong and thick silk was used. Two rows of sutures were put into the scrotum of the interrupted type, as well as in the skin of the abdominal wall incision.

Careful dieting was ordered, and no further treatment adopted other than giving an aperient and taking out the superficial sutures. A quantity of blood was passed with the fæces for a few days. It was a fortnight before the bullock really showed definite signs of recovery, but he has been normal now for several weeks.

The most interesting feature in this case, and the reason for reporting it, is the fact that a laparotomy through the inferior abdominal wall is possible in a bovine of the age of this subject.

Grass-Ill in Cattle.

By WM. T. HEWETSON, M.R.C.V.S.,

Brampton, Cumberland.

GENERAL.—Grass-ill in cattle may be defined as an acute or sub-acute disease, affecting principally young cattle from 12 months to three years old, characterised by partial or complete paralysis of the intestinal tract, by constipation and by great prostration. It frequently occurs among Irish cattle in the early spring shortly after they are released from quarantine. Irish cattle may be predisposed to the complaint since their livers are often affected with cirrhosis; it also occurs in Shorthorns, but seldom in Galloway cattle.

The disease is met with in the early spring when the weather is cold and wet, and when the wind is from the east or north. The animals are more subject when they are out of their hair and exposed to the above conditions with little or no shelter. Generally speaking, the symptoms in cattle are somewhat similar to those observed in the same disease in the horse and acute and sub-acute forms are recognised.

SYMPTOMS.—Acute form. The animal appears fuller than normal, looks dull and is listless. There is little or no appetite, rumination is suspended, and saliva drops from the mouth. There is evidence of constipation, and on introducing the fingers into the rectum, this organ is found to be empty and dry. At this time, however, a small ball of mucous may be passed. The temperature varies from sub-

normal to as high as 105° F., but the extremities are often found to be cold. To an ordinary observer the patient may not at first appear to be seriously ill, since the breathing at the outset is practically normal, there is no grunt and the eye is full and bright. Later on a moan develops with each breath, the eye sinks in the orbit, and the extremities and inside of the mouth become deathly cold. Grinding of the teeth and muscular tremors are frequently observed at this stage. Should the subject be a milk cow, the first symptom will be a great decrease in the milk yield. The acute form often proves fatal as the bowels are generally completely paralysed, purgatives and stimulants have no effect, and consequently the animal dies from auto-intoxication within a few days. If the bowels respond to medicine, as they occasionally do, with careful and diligent treatment, a cure may be effected.

SUB-ACUTE FORM.—In this form the animal is not found to be so full, but on the contrary is tucked up in the flanks. It may be found lying or standing off by itself, is dull, listless, and the eyes may be half closed, except when the attention is attracted, when the eye appears bright and full. The internal temperature varies, and may be as high as 106° F. So does the external temperature. Sometimes the animal feels comfortable all over, but at other times the legs and ears are cold. This variation continues throughout the course of the disease. Saliva drops continually from commissures of the mouth, despite the fact that examination reveals nothing abnormal in the mouth. Grinding of the teeth and rigors of the hip muscles are common symptoms. The breathing may be normal or somewhat catchy. The fæces are passed less frequently and in small amounts, are abnormally liquid and often contain mucus. In other cases the mucus is passed in large quantities either mixed with the fæces or as pure slime, and it may contain streaks of blood. Staggers, delirium, coma or paralysis of the limbs are not met with in this disease.

POST-MORTEM.—The lesions found immediately after death resemble yew poisoning. The contents of the rumen are soft and moist, as also the contents of the third stomach. There is no evidence of drying, the ingesta between the folds being moist. The fourth stomach contains liquid.

The mucous membrane of the rumen is readily stripped off leaving a congested surface beneath. A considerable amount of mucous membrane is found adhering, or mixed with the rumen contents, and there are often strips of mucous membrane hanging like ribbons to the wall of the rumen. There is congestion of the mucous surface of the fourth stomach, and there may be petechial hæmorrhages. The congestion is continued for some distance into the small bowel.

Macroscopically the glands do not appear to be involved. All the other organs appear to be healthy.

TREATMENT.—The animal must be placed in a comfortable loose box, and bedded with moss litter or sawdust, and on no account with straw or bedding it can eat. It must be covered with suitable clothing, and it is important that the clothing be properly tied or sewn on, to prevent it slipping off. The primary object is to purge the animal, and practitioners will no doubt differ in their methods to accomplish this. It has been found that, particularly in regard to choice of medicines, dosage, etc., no precise rules can be laid down as all cases cannot be treated alike. In the first place a moderate dose of magnesium sulphate or sodium sulph. and ginger or gentian, sweetened with treacle is administered. This is followed by ammonium carbonate $\mathfrak{z}\text{i}$, soda bicarbonate $\mathfrak{z}\text{i}$, and pulv. nux vomica $\mathfrak{z}\text{i}$, given in a quart of water twice daily.

As the bowels act irregularly it is necessary to give treacle twice a day, one, two or three pounds being used according to the size of the animal, and the condition of the bowels. The animal must not be purged drastically, but it is essential that the bowels are moved regularly throughout the course of the disease. If the animal is in a very bad state when first observed, it may succumb to the first dose of medicine, being due probably, to the medicine causing the liquid ingesta to be driven from the rumen into the abomasum and small bowel, resulting in absorption and death from auto-intoxication. On the other hand, if the animal can stand the first dose of medicine, there is good hopes for its recovery.

Linseed oil can be substituted for treacle, but it has the effect of destroying the appetite in animals that were previously taking soft food. Further, linseed oil has not the laxative effect on ruminants such as treacle possesses. During the course of treatment the animal at times will appear slightly tympanitic, an effect which may be due to the treacle given.

Hyposulphite of soda has been tried, but it does not appear to give any better results than soda bicarbonate. If mucus is passed in large quantities and especially if the animal is inclined to be purged, magnesium silicate (white bole) can be given with benefit. This is used once per day until the diarrhoea ceases. Some cases benefit by giving an occasional dose of a disinfectant, and other cases, particularly in the later stages, benefit from a few daily doses of nitro-hydrochloric acid dil. Should the patient pass blood in the fæces, linseed oil and chlorodyne is given twice daily until the dysentery stops. Thus, it will be evident that all cases cannot be treated exactly alike, but all must to a large extent, be treated medicinally according to the symptoms manifest.

AS REGARDS DIET.—Every patient must receive liquid or semi-liquid food only. All grass and dry food must be withheld strictly until all the symptoms of the disease have passed, such as dribbling of saliva and temperature changes, and until the fæces are normal in consistency and free from mucus. It is very important that the patient is not allowed to eat grass too soon. If grass is given, all the symptoms of the disease will reappear, and the animal will be worse than at the commencement. It generally takes about three weeks to bring about recovery ; sometimes a week or two longer.

When returning the animal to grass feed, allow only a small quantity the first time, and watch closely for 24 hours before giving more. If there are no ill effects, bring it on to its normal diet gradually. The food given during treatment consists of scalded bran, boiled linseed or linseed meal, calf meal, milk or any cooked or easily digested food.

DISCUSSION.—In my opinion the disease is caused by a poison generated in the stomachs by the ingesta being retained too long, and to paralysis caused by the extreme cold to which the animal has become exposed when out of its hair. The cold under these conditions may also have an adverse effect on the whole glandular system of the animal and so alter or change the glandular secretions to such an extent that they do not function properly in the process of digestion. Consequently, a chemical or biochemical poison is able to form in the stomachs and intestines, which upon absorption, gives rise to the trouble. Thus, it may be, that the sequence of events is materially assisted by the partial paralysis of the intestinal tract, since it results in retention of the ingesta which undergo decomposition. The clinical picture certainly suggests that a poisonous substance has been absorbed, probably from the stomach and intestines, as witnessed by the high fever, the sickly appearance and the degree of prostration. If the above reasoning is correct, it is obvious that rational treatment must be directed to the elimination of the poison from the system and from the alimentary tract, and the success which the treatment has met enables one to think that the foregoing hypothesis is correct.

Railroad Disease.

By W. R. DAVIS, M.R.C.V.S.

FIVE cows out of a mob of cattle delivered during the night at a large freezing works in New Zealand (the train runs into the works) were discovered on the following morning to be ill, and one cow was lying dead in the pen. Two of the patients were lying on the side, tympanitic, skin cold, unconscious, the cheeks puffed out at each expiration. These were immediately slaughtered. Of the other

three cows, one was on her feet staggering about the pen, the hocks extended and with the peculiar stiff gait observed in milk fever. The remaining two cows were on the ground, but on our entry into the pen, they struggled with difficulty on to their feet and blundering about, were soon down again. A marked improvement resulted from the inflation of the udders—sufficient to get the patients to the slaughter pen. The mob of cattle had been trucked from a considerable distance, had fasted long, and being "station" cows, had lived entirely at pasture. Each had borne several calves brought up as running suckers, the dams never being milked. The patients were all in good condition; the udders, however, were small (all were dry), and dilated but little on inflation. No gross lesions were observed *post-mortem*. It is generally asserted that tuberculosis is almost unknown among New Zealand cattle. This, however, is far from being the case. Dairy cows sent for slaughter to the abattoirs and to the freezing works quite frequently display tuberculous lesions. For the past 30 years a procedure very similar to the operation of our Tuberculosis Order has been in action. Suspected cases have been seized and compensation paid. Very large sums of money have been expended with little or no effect on the incidence of bovine tubercle. Pigs, too, are not infrequently found to be the subject of the malady; very frequently the submaxillary lymphatic gland alone being affected.

Ergotism.

By H. P. HAMILTON, B.V.Sc.,

Toronto, Canada.

ERGOTISM is defined by Dorland as being a "chronic poisoning from excessive or misdirected use of ergot as a medicine or from eating ergotised grain." *Claviceps purpurea*, or the essential element of ergot, possesses the ability to contract the arterioles and unstriated muscle fibres, and it is a powerful ecboic and hæmostatic.

Barger and Carr* in 1907, isolated an alkaloid, ergotoxine, from the fungus and it is thought that this alkaloid does not form more than 0.1 per cent. of the drug. It would therefore appear that an appreciable quantity of ergot must be ingested before disturbing clinical symptoms manifest themselves.

The report of W. Watson, in *Veterinarian* of 1859, page 574, states that it is a "popular belief that cows, grazing in a field containing ergotised grasses, aborted their calves," but according to Sir Frederick Smith's article in *Hygiene*, 1905, page 170, sheep and cows have been fed on quantities of ergot without dangerous effects.

* Transactions of the Chemical Society, 1907, p. 337.

The researches of Kaufman show that although very great doses would be required to induce acute poisoning, prolonged administration of small doses causes chronic ergotism, when besides gastro-intestinal irritation, coldness, anæsthesia, and dry gangrene of the feet, ears and tail, or comb tongue and beak in birds, ensue. The parts drop off without pain, and the disease closely resembles ergotism in man, death resulting from asthenia. He goes on to refer to the *post-mortem* appearances which he describes as being inflammation of the gastro-intestinal tract, flaccid and soft viscera, gelatinous muscles, dark blood, and injected mucous membranes of the organs.

Some authorities state that the toxic extraction of ergot acts on the nervous system, depressing the heart action and thereby restricting the blood circulation. In advanced cases the ears, tail and lower parts of the limbs of the affected animals lose warmth and sensibility, dry gangrene sets in, and the diseased parts finally slough away. (Henry and Morrison's "Feeds and Feeding," 1921, paragraph 396.)

There may be necrosis of the skin following the continuous eating of ergot where the extremities, ears, tail, combs and wattles of fowls as well as the tips of their tongues, and the bills of ducks, because of the insufficient supply of blood through the constricted arteries, become gangrenous and are sloughed off. (Hutyra and Marek, 1926, Vol. III, page 622.)

The authorities quoted above appear to insist that the effects on the animal body through prolonged ingestion of ergot are (1) dry gangrene produced by the contraction of the arterial blood vessels and (2) gastro-intestinal irritation and inflammation.

The fact that the tail, the hind feet and conchal cartilages of the ears become gangrenous shows that the arteries farthest removed from the heart suffer to the greatest extent, and that parts are most affected where collateral circulation is not possible.

The fact that ergotism frequently produces abortion appears to lie in the fact that the blood to the foetus is lessened by contraction of the middle uterine artery. It appears strange, however, that this branch of the external iliac artery is so much more affected than its fellow branch, viz. the circumflex iliac, by the action of ergotoxine, but this anomaly can doubtless be explained by the fact that during pregnancy the walls of this particular artery hypertrophy to allow the greater demand for blood to be realised; and as the walls are not completely normal under these conditions, it is possible that the drug has a greater effect on the nerves responsible for the contraction of this artery.

In a case presented at the College Hospital on January 13th, 1927, the autopsy revealed a well-formed foetus which would, in all

probability, have been born normally had the cow been allowed to live. There appeared to be no reduction in the size of the middle uterine artery or the placental coteledons. The foetus was in the sixth month of pregnancy and so was well advanced, which fact shows that ergotism may only have a fatal effect on foetal life if it has been ingested either before pregnancy occurred, or during very early foetal existence, i.e. before an increased blood supply to the foetus had been demanded.

In the case under consideration there were no *post-mortem* symptoms of gastro-intestinal irritation or inflammation which are usually seen in cases of ergotism according to Continental authorities such as Kaufman.

It must be remembered that there are no cases which manifest all the symptoms of the condition at one and the same time, and it is therefore necessary to formulate one's diagnosis on the most prominent symptoms present. Having before us the dry gangrene of the distal extremities of the hind limbs, together with that of both the conchal cartilages and of the caudal extremity, anæmic mucous membranes, quick pulse and hurried respirations which are indicative of the ingestion of toxic substances, we would be justified in attributing the cause of the symptoms presented to ergotism.

Pseudo-Leucæmia in the Dog.

By H. R. HEWETSON, M.R.C.V.S.,

Southport.

CASES of leucæmia and pseudo-leucæmia appear, so far as I have been able to ascertain, to be of very rare occurrence in this country. Whether this is a real state of affairs or whether it is because few are recorded or many escape observation, I am unable to state. Two cases which I have regarded as pseudo-leucæmia have come under my treatment within the last 18 months and have caused me no little dissatisfaction.

Two factors stand out which are not likely to enhance the practitioner's reputation in cases of this nature: (1) the difficulty of establishing a positive diagnosis, and (2) his apparent helplessness to combat what at first appears only a simple affection, but which over an extended period becomes progressively worse.

The first case which came under my attention was a Scotch terrier bitch, aged two years and nine months, and when I first saw her she had a slight cold and both sub-maxillary glands were a little enlarged. I took these to be associated with the cold and treated them as such, but when, in about a fortnight's time, they were rather

larger, I began to look more closely for the cause. I found that there were also two very small swellings in the pharyngeal region, and during the course of the next two weeks these were followed by pains in the axilla and inguinal regions.

These symptoms to me pointed to four alternative diagnoses: (1) leucæmia, (2) pseudo-leucæmia or Hodgkin's disease, (3) lymphosarcoma, (4) tuberculosis, and from the clinical evidence I was inclined to favour (2) Hodgkin's disease as the most likely.

The various authorities do not help us much in the clinical differential diagnosis and contrary opinions seem to be held as to alternative symptoms, but the more general trend seemed to indicate that where the swellings remained freely mobile it should be regarded as Hodgkin's disease, whereas in leucæmia they became more or less rigidly attached to the surrounding tissues.

A definite diagnosis was required, however—though it was not likely to have much practical value when obtained—and accordingly an examination of the blood was made.

I confess that my examination of the blood did not give me the definite results I desired, and so I sent away a sample for laboratory test. Here again I was disappointed. The report came to the effect that it was either (a) Hodgkin's disease, (b) malignant growth, or (c) tuberculosis and my client was naturally not very impressed. Tuberculosis was eliminated (?) by the tuberculin test, and as no evidence of any internal swelling or growth was to be found, I adhered to my original opinion of Hodgkin's disease.

The course of the illness is worth recording, since it differs slightly from the various descriptions I have encountered.

For about three months the bitch remained in excellent apparent health and condition, apart from the obvious swellings, and the appetite was good, but there were occasional attacks of choking due to the pressure of the glands in the throat. At the end of this period she grew more lethargic and experienced a difficulty in taking food unless it was made very small or soft, but the desire for it remained. The membranes became very pale, but it was not for a further two months that her condition began to become poor or any excessive thirst arose. At this time, though, five months from the onset, the disease made much more rapid strides, and in about three weeks emaciation was extreme, choking attacks were frequent and the glands enormously enlarged. Even now the appetite was good and any amount of food would be taken provided it was small or soft enough to be swallowed. The bowel actions remained regular throughout. In response to my insistent advice she was destroyed, the course having run just about six months, but a *post-mortem* was denied. *

So little appears to be known of the etiology that no rational treatment could be carried out, and a definite diagnosis was never really established. The various works on veterinary medicine give little real indication, other than the inevitable arsenic and iron. White, in his book "Principles and Practice of Veterinary Medicine," goes so far as to say of leucæmia: "Treatment in animals should not be attempted as it will not lead to success," and of pseudo-leucæmia: "In man, iron, arsenic, iodine and the X-ray are used to prolong life." His first statement may be sound in theory, but to tell a client whose dog appears well except for a few swellings that he is powerless to assist and that no treatment should be attempted is an action to which no sane practitioner could agree. True, we can advise that a cure is almost certainly out of the question, and that no treatment is known which can be shown conclusively to even modify the course of the disease, yet the client must feel that the best, even if a hopeless best, is being done for the patient. In this case a highly nutritive diet was prescribed, comprising chiefly meat, fish and green vegetables and all unnecessary packing withheld. After about two months three ounces of raw calves' liver was given daily, and it appeared temporarily that with this addition a very slight amelioration took place. Hæmoglobin and arsenic were pushed to their limit, and for a time the arsenic was given in the form of sodium cacodylate. Acting on the suggestion of iodine, "Iodalbin" (P., D. & Co.) was tried, but though persevered with until she literally smelled of iodine, no improvement was noticed. X-ray was objected to and was accordingly not unduly pressed.

I am satisfied that it is correct to say that, with the possible exception of a slight temporary improvement following the raw liver at first, the disease progressed steadily, slowly and unchecked to its conclusion, and I would hesitate to claim that any one of the treatments had any effect whatever in either retarding or accelerating its course from start to finish. So much for case number one.

Case number two, a cairn terrier dog six years old, is now under observation, and it is about a month since I first saw it and two months since its owner noticed the first symptoms. The sub-maxillary, pharyngeal, axillary and inguinal glands are all affected, the membranes are pale, choking symptoms are evidenced and the appetite, though not very good, is said to be normal and he is in good condition and spirits. Though fully agreeing to the medical value of blood tests, hypodermic injections, etc., the owner is unwilling to allow their employment in the case of her dog unless some fairly definite promise of successful treatment will be forthcoming therefrom, and so, for practical purposes, they are unfortunately eliminated.

In view of the experience in the first case, liver was immediately prescribed again and at the end of the first week he appeared to show some slight improvement, but this has not been maintained. Since empiricism seems to be the order of the day "Radiostol" has been given since the onset and has so far shown no benefit. The next step is to go wholeheartedly on with the liver treatment on the lines now generally adopted in cases of anæmia in the human subject. The difficulty will apparently lie in the somewhat unwieldy extract administration with the associated adjuvants.

Though in ordinary practice I dislike adopting treatments for which no rationale can be shown, these are cases in which I suppose we have to admit to purely empiric formulæ and I would be very grateful if anyone can suggest any line of treatment which is known to have even modified in a favourable manner, either of the conditions in any way.

Since writing the above, I have had consultations with a doctor who specialises in X-ray therapy, and a start has been made with deep X-ray treatment. The results so far are promising, but a further report will be withheld until after a more extensive trial.

Foreign Bodies in the Rectum. Two Peculiar Cases in Dogs.

By PROFESSOR G. H. WOOLDRIDGE, F.R.C.V.S., and
MR. J. W. H. HOLMES, M.R.C.V.S.,
Royal Veterinary College, London.

THE following cases show what remarkable things can pass through a dog's alimentary canal, and they also stress the importance of a rectal examination.

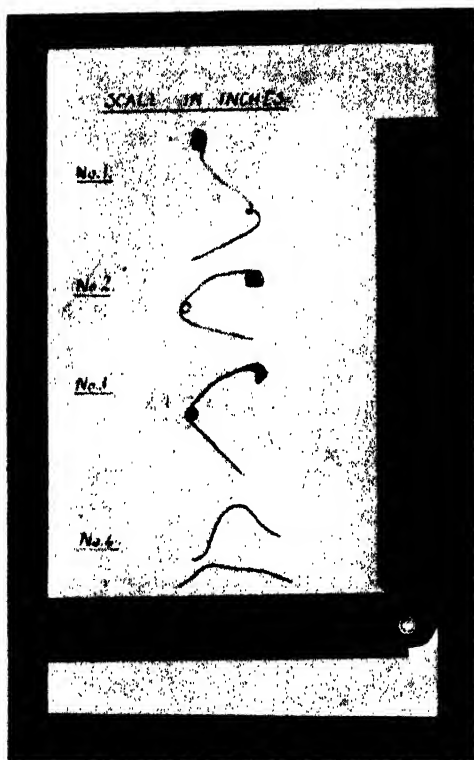
CASE 1.—On the afternoon of October 17th, 1928, a wire-haired fox-terrier dog was brought to the college, with the history that since the previous evening he had been making constant painful attempts to defæcate. There was a further history of the animal having been previously treated for distemper.

On observation the animal appeared quite bright, and showed no discharge from eyes or nose. Anal gland trouble was suspected, and these were examined, found to be slightly enlarged, and were expressed. Not being quite satisfied that the cause of the trouble had been found, a rectal examination was made. This proved interesting, for it revealed a foreign body, which on removal proved to be an open and badly bent safety pin. (No. 1 in photo.)

Thinking the mucous membrane of the bowel might be injured,

liquid diet was advised for a few days and medicine containing Bis. Carb. and Salol was given.

No sequelæ developed, and the dog was not seen again until December 11th, when he was brought along at 8.30 p.m., this time with the history that he had been seen to swallow another safety pin the previous evening, and that during the last two or three hours he had been making painful attempts to defæcate, as on the previous occasion.



The animal appeared quite bright. A rectal examination was made and the open pin (No. 2 in photo.) removed. It lay in the rectum with the hinged end posteriorly.

The after treatment was as before and with like result.

On January 7th the dog was again brought to the college and another safety pin removed. This pin (No. 3 in photo.) was open and bent, as before.

A point of interest physiologically is that the second and third pins took about 24 hours to reach the rectum.

CASE 2.—On November 19th, 1928, an owner

brought a three-months-old Alsatian male puppy to the college, asking for worm medicine for same.

The pup appeared quite bright, but a slight discharge from the eyes led one to take the temperature. On inserting the thermometer into the rectum it came into contact with "something" abnormal, and as a result a rectal examination was made, and two pieces of bent wire (No. 4 in photo.) were removed.

The after treatment and result were the same as in Case 1.

Cranslation

Paræsthesia in a Horse.*

By DR. FREDERICK GENOCH,

Assistant in the Surgical Clinic at the Veterinary School in Vienna.

ON March 18th, 1925, a black cart horse, nine years old, 173 c.m. high, was brought into the surgical clinic. The horse belonged to my brother in Esslingen, near Vienna, where for four years it had been worked on his farm, had been healthy, in good condition, and was recognised as a good draft horse.

On March 15th, 1925, the stable attendant noticed at the first feed that during eating the horse stamped continuously with the near hind foot. On this day I examined the animal and noticed the following: The apparently healthy horse (pulse, respirations, temperature normal, as well as the taking of food and drink) stamped when it stood in the stall with the left hind foot at intervals of 10 to 20 minutes and did this in series of 10 to 30 consecutive strikes. This stamping occurred as follows: The horse stood quite quiet for a time, then suddenly lifted the leg up high (the movement was similar to that of stringhalt), so that the foot was bent up to the maximal and then thrust down again with considerable force. Immediately afterwards he stamped out 10 to 30 times on the ground, the strokes being successively weaker. He then stood quiet again for a few minutes and afterwards started the same sort of stamping again without any external cause for it being ascertainable. When asked to move over either way the horse ceased stamping, as also when being harnessed or yoked. When walking or at work he was normal.

On examination nothing could be noticed in the limb. On palpation the horse showed nothing from the hoof half way up the metatarsus, but above that he resented and stamped on the ground. To lift up the left hind leg was impossible, even with powerful help.

On March 18th he came into the clinic. In order to make a fresh local examination the horse was cast. Although hobbled he became quite unruly on slight handling of the limb above the upper half of the metatarsus. On touching with a needle or puncturing the horse showed remarkable susceptibility (hyperæsthesia), so that this had to be done very warily as the reactions were quick as lightning. After marking out several areas and the injection of a strong novocain solution over both plantar nerves the horse could be examined quietly. No changes could be found. Hair and scales taken away from the

* *Wiener Tierarzt Monatsschrift*, Nov. 20, 1928.

fetlock region and examined for dermatophagus mites gave negative results. The limb was now thoroughly brushed with creolin solution. About half an hour afterwards, after the effect of the novocain had passed, the horse showed the old symptoms.

Further, the horse was rectally examined for thrombosis, but no changes could be found in the aorta, or hypogastric and iliac arteries.

On March 20th the horse was discharged as not cured and again put to work on the land. He remained under my observation and I noticed that the ailment grew worse. The previously good condition became slowly but constantly worse, although the appetite was good. The single pauses between the stamping movements became shorter and the stamping more violent. These stamping movements now occurred at work, the horse pulled up suddenly and began stamping. The horse when standing also often tried to gnaw at his left hind foot and drew it spasmodically away and made a series of stamps on the ground.

On April 27th he came into the clinic again and the owner wished him to be destroyed, but I persuaded him to carry on as the case was of great interest to me.

He was later turned out to grass, and towards the end of May the condition having improved, was put to light work again. On June 2nd he had infectious pleurisy and pneumonia (Brust-Seuche) and was treated with neo-salvarsan and on June 14th was well again. During this illness the disease of the limb improved, due probably to the salvarsan (a view modified or annulled later on), and in a further three weeks the stamping movements disappeared entirely. By the middle of July he was again in good condition and as good a draft horse as previously.

On November 30th the horse stumbled at work and could hardly be brought back to the stable. At midday he refused food and showed slight colic. Rectal examination showed impaction of the large colon. This was treated with aloes and arecolin and enemas. On examination per rectum with my arm in up to the shoulder I could just feel a nobby tumour about the size of a man's head. It was slightly movable forward, but not to left or right, and appeared fast in the region of the vertebræ. The animal was slaughtered.

Post-Mortem.

In the region of the left kidney was a hard nobby tumour which was fixed by hard connective tissue fibres to the iliac fascia and the loin muscles and to the region from the 16th dorsal vertebra to the beginning of the os sacrum. Its weight was 27 lbs. It had a connective tissue capsule of 10 to 12 centimetres in thickness. On section it was

greyish red in colour with light yellow masses superimposed. The tumour mass went gradually off into apparently normal kidney tissue.

HISTOLOGICALLY.—Sarcomatosis of the left kidney.

Remarks.

The tumour was in contact with the nerves of the lumbosacral plexus. The ischiatic plexus springs from the last nerve of the loins and the first two or three transverse nerves. Its direct continuance forms the ischiatic nerve, which divides up into the nervus peronæus and nervus tibialis. The medial and lateral ramus of the nervus peronæus as well as both plantar nerves of the nervus tibialis serve the skin from the metatarsus downwards.

At the beginning, through pressure or drag of the tumour on the nerves of the lumbar plexus, especially the ischiatic, there was persistent irritation of the skin nerves mentioned, which accounted for the paræsthesia and the cause of the stamping.

The betterment in July was due to destruction of nerve conductivity through advancing destructive process and ability to raise and manipulate the limb at this time without pain also pointed to the destruction of nerve conductivity.

Abstracts of Current Literature

Carlin, J.—**Gastrotomy in the Guinea Fowl.**—*Arch. f. wiss. u. prakt Tierheilkd.* BD 56. H 5, S 436-438.

A PERFORMING guinea-fowl had swallowed a valuable ear-ring belonging to an actress. Röntgen rays showed that the trinket was lying in the gizzard. Operation under ether narcosis. A long incision of 6 cm. was made 2 cm. from the middle line, beginning close behind the last rib. A funnel-shaped incision to the right under the edge of the drawn-out gizzard. The pearl of the ear-ring was found diminished in size by one half after clearing out the gizzard contents. It had been there two days. Suture of mucosa, muscle, and skin mastisol bandage. Healing per primam after five days.

L. Hugonneng, A. Morel, and A. Jung.—**The Toxicity of Alkaline Sewage.**—*Annales d'Hygiène*, Jan., 1928, p. 43.

ATTENTION has often been drawn to the danger of allowing water to flow into rivers, when such water contains free acids or toxic substances such as salts of lead, copper, zinc, arsenic, etc.

In 1926 a large reservoir of caustic soda solution was emptied into

the River Meurthe, and the fish were destroyed up to a distance of 15 kilometres (about 10 miles).

In the present case the water of a small river was polluted by water discharged from a factory for the stripping of galvanised iron, the process adopted being the passing of an electric current through vessels containing 6 or 7 per cent. caustic soda solution. The waste water contained caustic soda, sodium carbonate, sodium stannate, and a small quantity of tin partly in the colloidal state.

Experiments have shown that solutions of the same composition are highly toxic for fish; moreover, ruminants (goats and cows) which drink it show digestive trouble with intense diarrhoea.

It is to be noted that accidents occur even with only slightly alkaline waters comparable in alkalinity to some of the mineral waters tolerated by man. This indicates that great care is necessary to completely neutralise all waste before allowing to flow into rivers.

News

Gift of £5,000 to the Royal Veterinary College Fund.

ON Saturday evening, February 2nd, Messrs. Spratts, Ltd., held their annual dinner and dance, and a company of about 600 employees and friends spent a most enjoyable evening at the Great Central Hotel, Marylebone.

The occasion was taken advantage of to present Professor Hobday, the Principal of the Royal Veterinary College, with a cheque for £5,000 as a preliminary to the fulfilment of the promise made by Mr. Lethbridge, the Managing Director (on behalf of his co-directors) that Spratts, Limited, would raise the minimum sum of £20,000, in order to establish a Chair of Canine Medicine and Surgery, to be devoted to research into canine diseases.

In handing over the cheque Mr. Lethbridge spoke of the good work which the College was doing under difficult circumstances and wished the Rebuilding Scheme the best of good luck. Principal Hobday, in a few words of suitable acknowledgment, spoke of the great courtesy and encouragement which Mr. Lethbridge had shown towards the College plans, and the stupendous amount of work which had been put into the National Dog Week campaign by Capt. Hobbs and his staff of workers, the proceeds of which, too, were to be devoted, this year, to the College Funds.

University of London. Register of Boards of Studies for 1929.

VETERINARY SCIENCE.

(a) Teachers of the University.

- Bulloch, Prof. William, M.D., C.M., LL.D., F.R.S. *Lond. H.M.C.*
London Hospital, E.1.
- Cave, Prof. Thomas William, F.R.C.V.S. *S.E.Agr.C.*
Eastern Agricultural College, Wye, Kent.
- Clough, George William, D.Sc. *R.Vet.C.*
College, Camden Town, N.W.1.
- Evans, Thomas James, M.A. *Guy's H.M.S. &*
Guy's Hospital *R.Vet.C.*
Medical School, S.E.1.
- Hare, Tom, M.D., Ch.B., B.V.Sc., M.R.C.V.S. *R.Vet.C.*
Department of Pathology, Royal Veterinary
College, Camden Town, N.W.1.
- Roaf, Prof. Herbert Eldon, D.Sc., M.D., L.R.C.P., *Lond. H.M.C.*
F.R.C.S. 8, Arkwright Road, Hampstead,
N.W.3.
- Symes, William Legge, M.R.C.S. *St. Thos. H.M.S.*
Oakley, 39, *& R.Vet.C.*
Manor Road, Teddington, Middlesex.
- Wallace, Sir Cuthbert Sidney, K.C.M.G., C.B., *St. Thos. H.M.S.*
M.B., L.R.C.P., F.R.C.S. 26, Upper Wimpole
Street, W.1.
- Willcox, Sir William Henry, K.C.I.E., C.B., C.M.G., *St. My's H.M.S.*
M.D., B.Sc., F.R.C.P., F.I.C., F.C.S., D.P.H.
40, Welbeck Street, W.1.
- Wooldridge, George Henry, F.R.C.V.S. *R.Vet.C.*
Royal Veterinary College, Camden Town, N.W.1.

(b) Other Persons.

- Hobday, Frederick Thomas George, C.M.G., F.R.C.V.S., F.R.S.E.
Principal, Royal Veterinary College, Camden Town, N.W.1.
- McFadyean, Prof. Sir John, LL.D., C.M., M.B., B.Sc., M.R.C.V.S.,
F.R.S.E. Highlands House, Leatherhead.
- Moore, Maj.-Gen. Sir John, K.C.M.G., C.B., F.R.C.V.S. 16, Frogmal
Lane, Hampstead, N.W.3.

University of London Animal Welfare Society.

At a meeting of the University of London Animal Welfare Society held on November 21st, 1928, the following resolution, proposed by Captain Robinson, seconded by Mr. Fitzgerald, was carried unanimously :—

"Recognising the valuable work carried on by the R.V.C. in connection with the health of animals, this Society supports the R.V.C. and will co-operate in the common endeavour of furthering this definite aim. For the time being U.L.A.W.S. desires that any financial support which the Society may be instrumental in raising should be devoted to clinical work."

Notice

Where to Obtain the Anti-Distemper Vaccine.

AN important report submitted by the Distemper Research Committee to the *Field* Distemper Council and the Medical Research Council appeared in the Press on November 29th. It states that the Committee's investigation has reached a point when the knowledge acquired is capable of being usefully applied in practice to rendering dogs resistant to infection by distemper.

The report adds that with the object of providing dog-owners with the means of preventive treatment they have invited a laboratory well equipped for the commercial development of these results to undertake the preparations of the vaccine used with a view to its distribution.

As is only to be expected when a scientific announcement of such importance is made great interest has been aroused amongst owners of dogs, and numerous inquiries made as to where the vaccine can be obtained. It is deemed advisable, therefore, to inform inquirers and others interested that The Wellcome Foundation are actively engaged in undertaking the conversion of the experimental laboratory processes into large-scale production, and in due course hope to be able to issue the vaccine through Messrs. Burroughs Wellcome & Co.

Personal

MR. EDGAR MESSERVY, M.R.C.V.S., has been appointed by the Secretary of State for the Colonies as Veterinary Officer in Tanganyika Territory.

MR. T. D. LLOYD-JONES, M.R.C.V.S., D.V.S.M., has been appointed Veterinary Officer to the Government of Nigeria.

Errata

In the paper "A possible means of selection for non-deformity breeding in Dexter cattle" by Walter Landauer in the January issue of this Journal, several errors occurred in the list of references. The paper by Landauer and Thigpen has been published in *Folia Hæmatologica*, Vol. XXXVII, 1928/29. The paper by Mohr has appeared in Vol. XLI, 1926, of the periodical referred to. The following title, giving the most recent report upon differential counts of the leucocytes of cattle, should be added to the literature list, Kuhl, P., *Das Blut der Haustiere mit neueren Methoden untersucht. I Untersuchung des Pferde, Rinder-Physiologie*, Vol. CI.XXVI, 1919.

THE VETERINARY JOURNAL

Editor :

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HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING,
OFFICIER DU MÉRITE AGRICOLE (FRANCE),
CAVALIERE DEI SS. MAURIZIO E LASSARO (ITALY),
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GLADSTONE MAYALL, M.R.C.V.S.

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Editorial

THE VETERINARY INSPECTOR AS THE GUARDIAN OF THE FOOD SUPPLY OF THE NATION.

THAT the man who studies the diseases of animals and animal flesh *should* be the best, and indeed the *only* proper person to say "Yea" and "Nay" over the question of whether the flesh brought in front of him is diseased or not, seems to be indisputable, and yet how few of the big cities and towns of England have veterinary surgeons as meat inspectors.

On the Continent they do things better, and even in Great Britain our far-seeing Scottish legislators over the Border have, as usual in all educational and sanitary matters, given the "Sassenach" a lead in regard to both meat and milk.

The necessity for skilled veterinary inspection has never been more clearly amplified than over the recent question raised in Parliament in regard to the importation of diseased carcasses of mutton from New Zealand.

Between September, 1928, and February, 1929, over 21,000 sheep carcasses from this country, out of a total of about 284,000, were found upon veterinary inspection to be suffering from caseous lymphadenitis, and out of these no less than 17,593 were discovered in

London—in the districts, respectively, of the City of London, Finsbury or Southwark—whereas a further 3,336 were discovered in Liverpool, out of a total of 54,668. Some 70 cases were discovered at Southampton out of only 2,131 carcasses, and, altogether, since September 1st, 1928, there have been no less than 17,593 carcasses condemned.

Even if there were no other diseases about, the above figures of carcasses sent from our premier exporting colony illustrate beyond argument the necessity for an efficient Municipal Veterinary Service ; and the young graduate of to-day has opportunities in this direction which were never even available when the present generation of elderly practitioners was in its student days.

The prospects of occupying a well-paid billet are alluring, but it is up to the individual who fancies that side of the profession as his career to see that the pay and conditions are satisfactory—and there never was a time when “vis unita fortior” ought to be our motto—and he acted upon practically.

That “the labourer is worthy of his hire” is a very old proverb, and one which we of the veterinary profession seem always to have fought shy of making complaints. Now, however, is the opportunity to assert our rights and get adequate pecuniary remuneration, for one must not forget that it is a whole-time job.

Let, therefore, the newly qualified man bear this in mind, and not forget that no one can legitimately have his name on the Register of the Royal College unless he has gone through the whole of the syllabus and taken all the qualifying examinations—a period of intense and unceasing study for four, or may be five, or even six, years.

General Article

THE LUNG WORM AND THE STOMACH WORM IN THE CAT.

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Introduction.

IN 1865, Leuckart found in the stomach of the domestic cat a minute bursate worm which he named *Ollulanus tricuspis*.

He found also what he believed were the free larvæ of *Ollulanus*; forms which measured about 320μ long by 15μ wide, had a truncated oral extremity and a short tail which ended in a short S-shaped tip (Pl. 1 (a)): the œsophagus was between one-third and one-half of the total length of the intestine. Although there are seldom more than three embryos inside the female, larvæ were usually found in large numbers throughout the whole intestinal tract of the host, as well as encysted (in cysts $\cdot 15$ to $\cdot 2$ mm. in diameter) on various internal organs. The cyst wall had a connective tissue-like structure of such thickness that it might be three or four times the diameter of the enclosed space. This space was either filled by the tightly wound coils of the worm or with a clear liquid. If present in large numbers in the lungs, these capsules caused the appearance of miliary tuberculosis—especially when surrounded by an area of hepatisation. They might even be the focus of a widespread inflammation which in one of his cases at least, led to the death of the cat. Embryos were not found in the blood or muscles, but in heavy infections were free in the bronchi.

The encysted embryos, unlike *Trichinella*, did not continue their development, but gradually degenerated, and finally came to resemble an egg. Leuckart fed these embryos to a mouse and six weeks later found hundreds of them encapsuled in the muscles—these forms being intermediate in form between the free embryo and the fully developed *Ollulanus*. The capsules—about $\cdot 3$ mm.—were not only found in the rump muscles and œsophageal wall, but also in the heart and in the loose connective tissue of the neck. The wall was a simple connective tissue one, surrounded by nodules and containing numerous granules which were moved about by the movements of the larva (Pl. 1 (b)). The enclosed worm had increased in size and was about $\cdot 8$ mm. long by $\cdot 04$ mm. broad. The blunt end showed a retracted chitinous

disc which, from analogy, might be taken as the first indications of the future mouth. The cuticle was thicker and ringed. Round the lip-like projections were a few papilla-like outgrowths. The tail was simple and pointed. The intestine had not changed except that the pharynx was comparatively shorter and showed a muscular structure. The intestine was brown and towards its middle the slightly enlarged bean-shaped genital primordia could be seen.

He was unable to decide whether these stages had reached maturity, but going by the results of an experiment, he considered that further development in the mouse was possible. An infected mouse was fed to a cat and eight days later the worms were recovered from it unchanged, but in the cæcum and rectum, not the stomach. As only a few were found, it was believed that they were en route for the exterior and Leuckart considered that all the conditions necessary for further development were not present.



Plate 1.—(a) Embryo of *Ollulanus tricuspis* (after Leuckart, 1867).

(b) Encapsulated embryo in muscles of mouse (after Leuckart, 1867).

Only one other experiment is recorded. Two young rats were fed with the stomach wall of a cat infected with *Ollulanus* larvæ, and after 24 hours and three days respectively, the majority of the introduced worms were recovered alive and undamaged in the stomach.

Cobbold in Britain was also studying the parasite, although he preferred to use the name *Olulanus* instead of the more correct *Ollulanus*.

In discussing the probable life histories of the lung worms in general, Cobbold (1875) drew attention to Leuckart's belief that "all these strongyloides required a change of hosts before they can take up their final abode in the sexually mature state. This he infers especially because their respective embryos display characters very similar to those exhibited by *Olulanus*."

He considered the question fully in a paper read before the Queckett Microscopical Club in 1885. He stated that his first acquaintance

with the larvæ of *Olulanus* was made about 35 years previously, when a young cat in his room suddenly rushed about and finally fell dead, asphyxiated. While yet warm, it was dissected and its lungs were found to be swarming with nematode larvæ. Drawings were made, but no specimens were preserved, and it is not stated whether any adults were seen in the stomach.

He then briefly recapitulated Leuckart's work on the subject, and described a case which he had seen with Mr. Gay, a surgeon, in which a family, together with their donkey and cat, had suffered from a condition which was suspected to be Trichinosis. On investigation, no evidence of this was found, but the lungs of the exhumed cat were

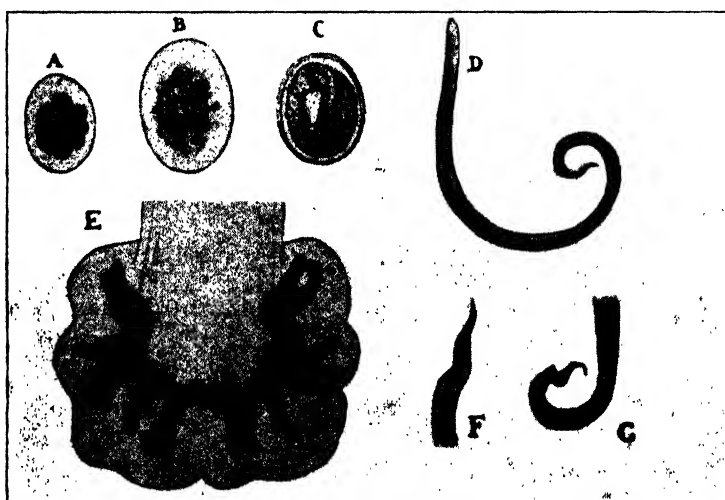


Plate 2.—(a), (b), and (c), Eggs of *Strongylus pusillus* (after Railliet). (d) Free embryo (after Railliet). (e) Bursa of *Strongylus pusillus* (after Müller). (f) and (g) Posterior ends of embryos (after Müller)

found to be swarming with "Nematoids." Cobbold considered that this was a case of "Olulanosis," and states that "Whatever interpretation be put upon the human outbreak, the coincidence of the occurrence in man of an affection symptomatic of trichinosis, found in association with a trichinoid affection in an animal which proved olulaniasis, was both curious and instructive."

No subsequent work on the subject seems to have been done, excepting some negative experimental attempts at infection by Galli-Valerio in 1921.

Meanwhile, in 1890, Müller described from the cat in Germany a new form of lung-worm which he called *Strongylus pusillus*, and Railliet (1898) proposed the new specific name of *S. abstrusus* instead;

Later (1907) Railliet and Henry transferred this species to the genus *Synthetocaulus*, a genus recently shown by Leiper to be a synonym of *Protostrongylus*.

It is unnecessary to recapitulate Müller's description of this parasite. The original figures are reproduced (Pl. 2), which show that Leuckart had confused two separate and distinct parasites in his work. This is further confirmed in the account of the life histories which follows.

Both of these parasites have been mentioned in veterinary literature since the dates of their discovery, but nothing has been added to our knowledge of their morphology and life history.

The "Lung-Worm" of the Cat.

The length is approximately 4 mm. in the male and 9 mm. in the female.

The mouth opening is surrounded by six inconspicuous papillæ, and opens directly into the short almost cylindrical cesophagus, which is about 0.25 mm. long.

The male has a small but well-formed bursa, which is complete and undivided. The cuticular bursal supports seen in *Protostrongylus* are absent.

The spicules are similar and equal, measuring 0.075 mm. in length. Each consists of a cuticular tube, which is swollen anteriorly, but terminates in a blunt point. To each is attached a voluminous sheath which is transversely striated, but which is without the supporting fingers seen in *Protostrongylus*.

The female has a double genital system. The tail is bluntly pointed and there are no papillæ present. The anus is 0.04 mm. from the tip of the tail and the rectum is very short. The vulva is 0.09 mm. from the anus and communicates with a long single vagina, which in turn joins the two parallel uteri. The vagina is about 1.5 mm. long and contains unsegmented eggs measuring about 80 μ long by 70 μ broad.

This parasite was originally placed in the genus *Protostrongylus* by Kamensky, and in the genus *Synthetocaulus* (which is a synonym of *Protostrongylus*) by Railliet and Henry, but it obviously does not belong to the same genus as *Protostrongylus rufescens*; and accordingly the new genus *Aelurostrongylus* has been created by the writer for its reception. Its correct name is therefore *Aelurostrongylus abstrusus*.

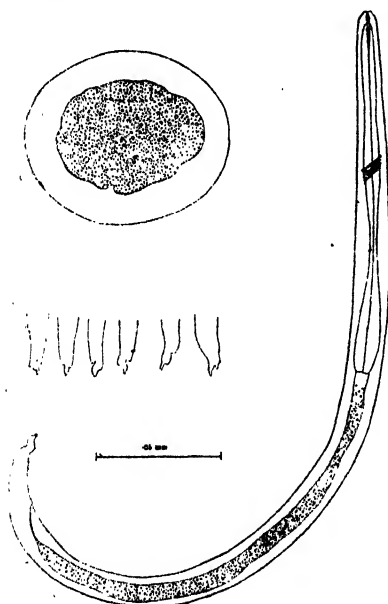
The Morphology of the Larva in the Cat.

The eggs, laid in the alveoli and parenchymatous tissue of the lungs, hatch *in situ*, and the larvæ migrate up the trachea, and are

swallowed and pass out with the fæces. From the time of hatching until the time that they leave the body in the fæces, no apparent change in morphology takes place.

The larvæ have been allowed to hatch in the dead body of the female *Aelurostrongylus*, so that there is no possibility of this being the larval stage of any other species of worms.

The larva is about 0.36 mm. long and 0.015 mm. broad (Plate 3). The mouth opening is simple and is surrounded by six low papillæ. The cuticle is covered with very fine transverse striations and a double lateral line is seen, suggesting that the first larval stage is omitted in this species.



Aelurostrongylus abstrusus. Plate 3.—Ovum and larva as found in the lungs and intestine of a cat, showing the variation in tail form.

The œsophagus is 0.14 mm. long and has a central, as well as a posterior, swelling. The anterior part of the œsophagus, terminating at the central bulb, is largely muscular; the posterior portion is distinctly glandular. The anterior swelling has a diameter of about 0.006 mm., the posterior swelling, about 0.01 mm., and the narrow part, 0.003 mm.

The œsophagus communicates with the mouth opening by means of a cuticular buccal tube which seems to be continuous with the œsophageal lumen. This tube is dilated centrally, but converges slightly towards its anterior junction with the inflexed cuticle.

The intestine is very granular and measures about 0.19 mm. in length. It is connected with the anus by means of a short cuticular rectum. Just posterior to the anus is a small protuberance which is inconstant in size, but is always present. The anus is about 0.03 mm. from the tip of the tail.

The tail is very characteristic and carries an undulating appendix and normally a dorsal projection: these vary very considerably in size and relative position.

Biology of the Larva.

Although larvæ are numerous in the intestinal contents, it was found more convenient to collect them from the lungs. An infected lung was minced, and after mixture with water, the fluid was strained into a centrifuge tube. The precipitate consisted of small particles of lung tissue from which the larvæ could be easily isolated in pure culture.

The larvæ are very active when isolated on a slide from the lung or intestinal contents, and, when collected in water, they still retain their activity. They normally move about with an undulating movement, but in a fluid medium make very little forward progress. In mucoid fæcal material, however, they do progress slightly. They do not appear to climb from fæcal cultures in Petri-dishes as so many of the Strongyle larvæ do.

SKIN PENETRATION.—A number of larvæ were collected in a small drop of water and tested for skin penetration by means of the Goodey "Floating Raft" technique, the skin of a young rat being used. The larvæ moved actively on the surface of the skin, but made no attempt to penetrate it. After the drop of water had evaporated the surface of the skin was covered with egg albumen and when this had dried, the skin was fixed, and serial sections cut. The larvæ could be seen on the surface and none had attempted to penetrate the skin. The saline used for floating the raft was centrifuged, but no trace of larvæ could be discovered. This experiment was repeated with larvæ from the fæces (collected by straining, and decanting and centrifuging) varying in age from one to eight days. In all cases, no larvæ were found to penetrate the skin, and it appears legitimate to conclude from this series of experiments that the larvæ are not skin penetrators.

DURATION OF LIFE.—The larvæ do not seem to be able to live in the free state for over a fortnight—the longest period for which the writer could keep them alive in water being 11 days. They appeared to die even earlier in fæces. During their period of free life only degenerative changes were observed, and in no case did they show any sign of further evolution.

FEEDING EXPERIMENTS WITH MICE.—Following the example of Leuckart, these larvæ were fed to a number of fawn white mice bred in captivity. All the mice were obtained from the same source originally, although later some were bred in the laboratory. In all 46 mice were infected, but owing to outbreaks of sarcosporidiosis and of Rat Bite Fever, a number died before the experiments were completed. Of the remainder, 11 were examined and were found to have developed cysts, while 14 were destroyed at various dates after infection and preserved pending further investigations. Six mice

were found to be negative, so far as could be seen. All these experiments were fully controlled by keeping mice of the same origin and age, uninfected with larvæ of *Aelurostrongylus*: in none of these was any extra-intestinal parasite ever found. In this way, 21 control mice were examined. Mice were fed in batches: (a) by feeding on infected embryo-bearing lungs; or (b) by feeding with larvæ isolated from lungs or intestine or stomach placed on moistened biscuit or bread. Care was taken to see that all the material was eaten, but it was not possible to say if every mouse in every batch had swallowed larvæ. It is, therefore, impossible to say whether the six negative results recorded above were due to not being infected, or were slight infections overlooked, or were really failures. Sufficient positives

were obtained, however, to make it certain that the larvæ described below are really further stages in the development of *Aelurostrongylus*.

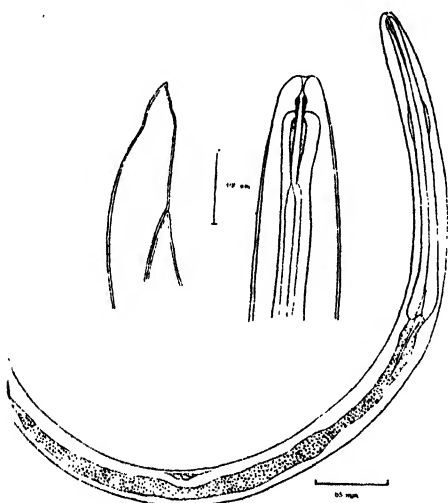
The Infective Larva.

It was found that the most convenient way to find if a mouse was infected was to pin the animal on a board with its abdominal surface upward. The skin was then reflected from the inner surface of a hind leg and the underlying areolar tissue examined. The worm-containing cysts were often

visible to the naked eye, as "bubbles" lying superficial to the muscles of the leg. Whether so visible or not, a piece of this tissue was removed with curved scissors and placed between two slides and examined microscopically. In this way material was obtained for the following description. If the mouse proved to be infected the remainder was fed to a kitten.

The cysts are about 0.3 mm. in diameter, and have a thin fibrous wall. They are filled with a yellow granular or caseous material in the centre of which the larva is seen coiled on itself.

When removed from the cyst the larva is found to be 0.725 mm. long (Plate 4) and about 0.025 mm. in thickness. It is finely striated transversely. The oesophagus is now 0.2 mm. long, *i.e.* the ratio



Aelurostrongylus abstrusus. Plate 4.—Larva found encysted in the mouse.

of the length of the œsophagus to the body length is 1 : 3·5 ; whereas in the earlier larva it is about 1 : 2·5. The central bulb has disappeared and the posterior bulb is relatively smaller. The whole œsophagus is much more muscular and less granular than in the previous stage.

The mouth is a simple pore communicating with the œsophagus by means of a cuticular buccal tube. The buccal tube consists of a more highly cuticularised anterior portion, and a less highly cuticularised posterior portion which communicates directly with the lumen of the œsophagus. The anterior portion has a small number of rugæ on its exterior surface, while the interior surface is smooth.

The intestine is about 0·35 mm. long and is very granular. It communicates with the anus by means of a straight rectum about 0·02 mm. long. The anus is situated about 0·04 mm. from the tip of the tail.

The tail is bluntly pointed. Towards its tip, the body narrows rather suddenly and the posterior portion is surrounded by deep striations which give it a serrated appearance. There is now no trace of the undulating appendix seen in the previous stage (Plate 3).

Experiments on Cats.

The experimental work on cats fell into two groups : (a) feeding with free larvæ from other cats ; and (b) feeding with encysted larvæ from mice.

(a) Four cats were fed on various dates with the larvæ isolated from the lung tissue and from the intestine. The first two were fed from street infections which were contaminated with *Ollulanus tricuspis*. In these two animals the infection with the latter parasite was demonstrated on *post-mortem* examination, but in all four no evidence of *Aelurostrongylus* could be seen.

(b) Seven animals were fed at various dates with mice which contained encysted larvæ as described above. Two of these animals died from distemper shortly after infection, and no evidence of lung infection could be seen. In the other five, however, *Aelurostrongylus* was found in the lungs.

Habitat.

The exact habitat of the adults has never been described. There are four possible localities in the lungs where parasitic worms can live : in the bronchi or bronchioles ; in the alveoli ; in the interstitial tissue ; or finally, in the blood vessels of the lung.

During a study of the lesions provoked by this parasite in the lungs of the cat, one was struck by two peculiar facts. Firstly, adults were never seen in several hundreds of sections examined, although

eggs and larvæ were plentiful. The adults were only found in teased specimens. (The sections were mainly prepared from marginal portions of the lung.) Secondly, the eggs in varying stages of development were evenly distributed throughout the lung and were not isolated in any particular area.

These facts suggested the possibility of a blood distribution of the eggs, and the blood stream as the normal habitat of the adults.

An infection in a kitten was diagnosed by the presence of the characteristic larvæ in the fæces. The vessels between the heart and the lung were then ligatured close to each of these organs, but without in any way interfering with them. The ligatured portion of the vessels was then removed, opened in saline and the contents shaken out. Fully adult male and female specimens of *Aelurostrongylus* were found in these vessels. The lung itself was then removed from the body, and still other adults were recovered in the larger branches of the pulmonary vessels.

Although there are many essential details of the life history of *Aelurostrongylus abstrusus* still remaining to be elucidated—more especially the development of the larva in the mouse and the development of the adult in the cat—it may be stated that the essential outline of its life history is as follows :—

The adult parasites become mature in the pulmonary vessels, and the female deposits her large, thin-shelled eggs in the blood stream. They are mechanically carried to the capillaries of the lung, where their progress is arrested, and where the unsegmented ovum develops into the characteristic larva. When mature, the larvæ force their way through the thin-walled tissue into the alveoli, and in this way reach the exterior after traversing the bronchioles, bronchi, trachea and alimentary tract. Occasionally in very young animals and with very heavy infections, the eggs themselves rupture the capillaries and, escaping in an undeveloped condition into the alveoli, then continue their development.

The fæces are eaten by mice and the larva migrates to various situations among the muscles and in the subcutaneous tissue, where, within three weeks, it assumes an infective, encysted form. It may remain viable for at least a year in this situation. If the mouse is now eaten by a cat, the larva escapes from the cyst and, reaching the lungs, within six weeks becomes a mature egg-laying adult.

While the present writer has never seen larvæ outside of the respiratory or alimentary tracts, Leuckart has described them from various parts of the body. Leuckart believed that he was dealing with the larvæ of *Ollulanus*, but in that he was undoubtedly mistaken.

His infections were, unknown to him, mixed ones, of both the lung and the stomach forms.

Recently, Professor Leiper has been conducting a series of experiments with *Trichinella spiralis*, and he was struck with the unusual appearance of the cysts in cats caused by the larva of this species. Instead of the usual lemon-shaped cyst so characteristic of mice and pigs, the cyst was almost spherical, although the infection was originally from rats with "normal" cysts. This is obviously because the host reaction in the cat (and examination of cysts from other carnivores, showed that it is probably a group reaction) differs from that of the rodent or the pig, and is not due to there being present a different species of *Trichinella*. These cysts measure about 0·2 mm. in diameter and correspond to Leuckart's description, except that the cyst wall is not so thick. As rodents are naturally eaten by cats, it is possible that Leuckart's animal in addition to suffering from *Aelurostrongylus* and *Ollulanus*, also suffered from a *Trichinella* infection; but their distribution does not lend support to this hypothesis, as they occurred in situations where *Trichinella* larvæ rarely are found. From the above discussion, it would seem more probable that they were larvæ which had—either as ova or larvæ—passed through the pulmonary capillary network and so been carried to the various organs by the blood stream. The encystment would be the natural reaction of the host tissues to any foreign body.

The geographical distribution of *Aelurostrongylus abstrusus* is incompletely known. It has been reported from Germany, France, and from Northern Italy and Switzerland. It has not previously been recorded from Britain, but there is little doubt that the forms seen by Cobbold and Stirling should be referred to this species.

Ollulanus tricuspis, the Stomach-Worm of the Cat.

The adult worms live on the surface of the stomach and in the acini of the stomach glands. In very heavy infections, they may even be found in the first inch of the duodenum, but they have never been found beyond the duodenal flexure. This is analogous to the state of affairs seen in other stomach worms in other animals. Their presence on the surface of the gastric mucosa causes the production of a thick glairy mucus which assists in keeping them in position. They appear to be very lethargic in their movements.

In the fresh state the parasites are colourless, and are generally found with the head end coiled on itself. They are very minute, the male measuring only ·7 to ·8 mm. in length, with an average breadth of ·035 mm.; while the female is ·8 to 1 mm. long, and about ·04 mm. broad.

The cuticle is faintly striated transversely and more conspicuously striated longitudinally.

THE ANTERIOR EXTREMITY.—A small buccal cavity is present containing no teeth, cutting plates, or similar structures. The cavity is formed by a reflection of the cuticle, and in optical section is almost spherical (Plate 6). The lateral diameter is $\cdot 004$ mm., and its antero-posterior diameter is $\cdot 005$ mm.

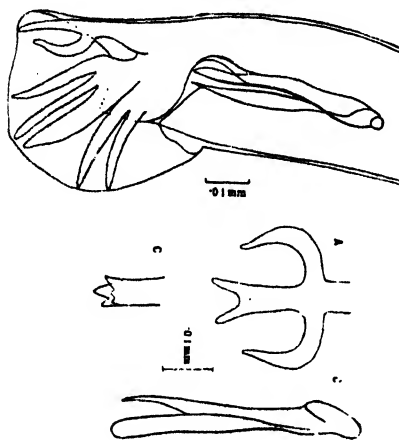


Plate 5.—*Ollulanus tricuspis*. Tail of male *Ollulanus tricuspis*. (a) Dorsal ray of male bursa, (b) Spicule, (c) tail of female.

The oesophagus, which is about $\cdot 2$ mm. long, is only slightly swollen posteriorly. The oesophageal muscles are poorly developed.

THE MALE.—The bursa (Plate 5) is undivided, and is open only on the ventral side.

The spicules are equal in length (about $\cdot 05$ mm.) and are bifur-

cated, one bifurcation being sharp and the other rounded. There is no accessory piece.

THE FEMALE.—The vulva (Plate 6) is a prominent structure situated in the posterior region of the body, which it divides in the ratio of approximately five to one.

The vulva opens into a short vagina, which is continued anteriorly as a single uterus. The junction of uterus and vagina is surrounded by a granular mass in the immature female.

This disappears in the mature female. There is no ovejector. The single ovary originates about the level of the oesophageal bulb, and insensibly joins the uterus: the ova are very large and granular.

As the worm becomes older, the ovary becomes confined to the anterior part of the body, the remainder of which is occupied by the

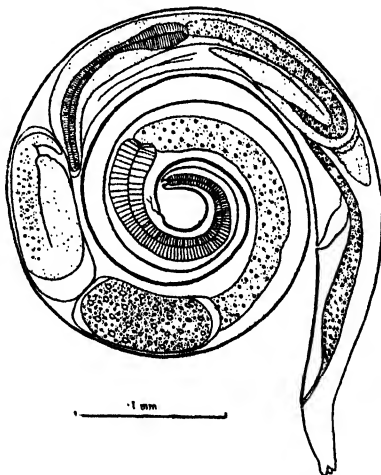


Plate 6.—*Ollulanus tricuspis*. Gravid female showing egg, developing first stage larva and developed first stage larva. A second stage larva was also removed by dissection from this specimen, but it is not shown in the drawing.

intestine and one to three very large larvæ ($\cdot 3$ to $\cdot 35$ mm. long). The anus is situated about $\cdot 03$ to $\cdot 04$ mm. from the posterior end.

The tip of the tail has typically three "cusps" or teeth; but occasionally one or two small extra cusps are found.

GENERAL EVOLUTION.—The large granular egg formed in the single uterus gradually develops into a larva, which escapes from the thin eggshell, and subsequently moults—still inside the female—resulting in a form with tricuspid tail. The next stage seen is free in the stomach of the cat. Finally, also free in the stomach, is found a stage comparable with the fourth stage larva of the other Strongyles. The sheath of this form, in both sexes, carries a typical tricuspid tail.

All the forms found free in the stomach of the cat—except the adult male—possess a typical tricuspid tail and bear no resemblance whatever to the larva of *Aelurostrongylus abstrusus*.

THE FIRST LARVAL STAGE.—This form is first seen inside the distended egg-shell (Plate 7), but ultimately comes to lie free in the uterus of the female. The description of this and the next stage has been prepared from specimens dissected from the uterus of gravid females.

This larva differs from all subsequent stages in possessing a round blunt tail. It is $0\cdot 35$ mm. long and about $0\cdot 002$ mm. in thickness. The mouth opening is a simple pore, apparently not surrounded by circumoral papillæ. A distinct buccal tube, somewhat dilated centrally, connects the mouth pore with the œsophagus. The œsophagus is about $0\cdot 125$ mm. long and is of the usual type seen in young strongyle larvæ, i.e. it has a posterior bulb ($0\cdot 013$ mm. in width) joined by a constriction to an interior swollen portion ($0\cdot 01$ mm. wide).

This stage is later seen to become "vacuolated" at both ends and at the posterior end the tricuspid tail of the next stage may be seen in process of formation.

THE SECOND LARVAL STAGE.—This form is about $0\cdot 34$ mm. long and has a typical tricuspid tail. The cuticle is finely striated transversely. The mouth opening is a simple pore which communicates with a buccal tube which is cuticularised and is reinforced anteriorly with a cuticular ring. It communicates with an œsophagus which is similar in shape to that seen in the first stage and which measures $0\cdot 13$ mm. in length. The intestine is very granular and measures $0\cdot 16$ mm. in length. It communicates by means of a short rectal tube with the anus which is situated about $0\cdot 03$ mm. from the tip of the tricuspid tail.

The next stage to be described has always been found free in the stomach, but forms apparently similar but measuring $0\cdot 4$ mm. in

length with an œsophagus 0·0125 mm. long, have been dissected from gravid females.

THIRD STAGE LARVA.—This form measures 0·5 mm. in length with a width of about 0·022 mm. The skin is finely striated. The mouth opening is simple, but it communicates with a V-shaped buccal cavity, the straight sides of which are cuticularised. The œsophagus which still has a slight constriction, is 0·15 mm. long with a maximum width of 0·012 mm. The intestine is very granular

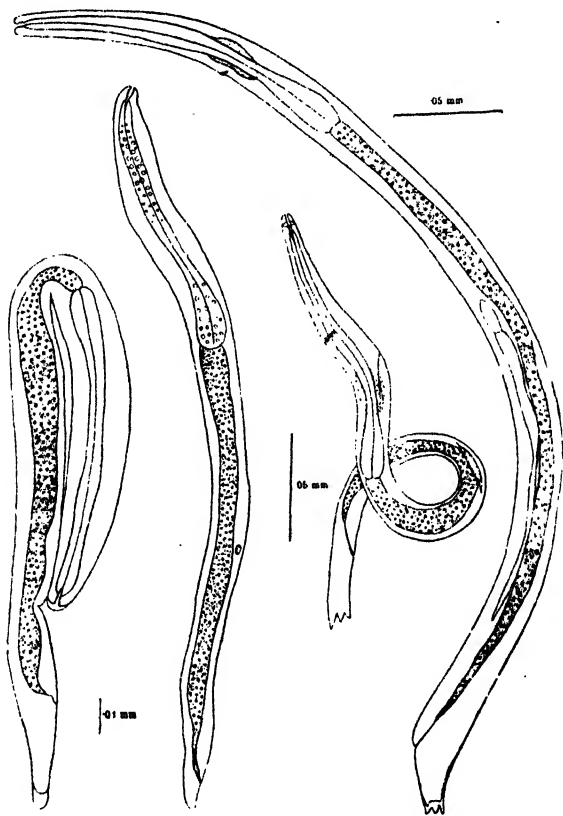


Plate 7 (left to right).—Developing first stage larva : fully developed first stage second stage : third or infective stage.

and measures 0·35 mm. in length. Towards the posterior portion of the intestine, and running parallel with it, is seen the elongated genital rudiment. There is, of course, still no trace of a genital opening. The anus is 0·03 mm. from the tip of the tricuspid tail.

This form, unlike the adults, usually lies curved like an arc, and is found, not only in the same position as the adults, but free in the cavity of the stomach.

THE FOURTH STAGE LARVA.—These are usually found on the surface of the mucosa of the stomach. The sexes are distinct.

The female is 0.625 mm. long and the œsophagus is 1.4 mm. to 1.6 mm. long, and claviform in shape. The intestine resembles the adult intestine. The mouth opening, in all the specimens observed is undergoing change and the temporary buccal capsule is being replaced by a new one on the anterior end of the œsophagus. The ovary is present as a long tube running forward to almost the level of the beginning of the intestine. Posteriorly it becomes vacuolated and joins a vulva, which does not yet communicate with the exterior. The anus is present in its final position and is joined to the anal opening of the larval sheath. The sheath and body have the typical tricuspid tail.

The male is about 0.65 mm. long. The digestive system is similar to that seen in the female. The male genital tube is present as a solid mass running forward from the cloaca, which it appears to join. The bursa has assumed its final form and spicules and accessory piece are present. The larval sheath is swollen posteriorly, but contracts at its extreme tip to form a tricuspid appendix.

The Biology of Ollulanus.

Early in the experimental work, it was found to be comparatively easy to produce a stock infection in cats by transferring the fresh stomach contents of an infected animal to an uninfected kitten by feeding. The question of the natural exit of the parasite was, however, not solved by these experiments. In most animals only two normal routes whereby a parasite may leave the stomach can be found: (a) by passage with the fæces to the exterior; or (b) by remaining in the stomach till after death, when it would be eaten by some intermediate host or even by a definitive host.

Repeated search of the intestinal tract of all the infected cats in this series of experiments failed to reveal any trace of *Ollulanus* larvæ, and the first route did not seem to be the normal one in this case. Experiments with mice, fed not only on the stomach, but on the intestinal contents, were also uniformly negative.

In the cat a third possible route may be considered, viz. by emesis. The cat is able to vomit with such facility, and it does so with such regularity—often eating grass to cause emesis—that the action might almost be called a normal one. The parasite, moreover, causes an inflammatory or a catarrhal condition of the gastric mucosa, and emesis, therefore, would be a natural sequel to this infection. Moreover, cats will readily eat the vomit of other cats, especially if they are hungry, and all natural infections of this parasite which I have

seen, have occurred in stray, badly-fed animals. Accordingly it was decided to test the possibilities of this route.

A cat was infected by feeding on an *Ollulanis* stomach, and a few months later was injected subcutaneously with apomorphine (in preference to an oral emetic which might have affected the parasite). The animal vomited in a few minutes, and a rapid examination of the vomit showed the presence of the third stage larva. The mass was placed before a kitten, which readily ate it. When this animal was destroyed a few months later, it was found to be heavily infected with *Ollulanis*.

This suggests that infection may be produced by direct feeding of the vomit of an infected animal.

Another cat was placed in the same cage as the first, which was observed to vomit occasionally, and it was given the opportunity of eating the vomited material. When it was destroyed some months later, it also was found to have acquired the parasite.

Accordingly it seems probable that emesis is at least one method of conveying the infection from one animal to another, and although it is not claimed that this is the only method, so far no other is apparent.

A fourth cat was infected with 10 larvæ—similar to those observed in the vomit—and when destroyed six months later, was found to have a very heavy infection of fourth stage larvæ and adults of *Ollulanis*. During this period it had been enclosed in a cage by itself and could not possibly have been infected from outside. It seems extremely probable that this is due to continuous auto-infection from the animal's own vomit.

At the same time, it is not possible to exclude entirely the continuous development of the parasite within the host, especially when it is considered that only a very short time need necessarily elapse between the emission of the larvæ in the vomit and their ingestion by another host. In most other parasites a "time factor" outside the body of the definitive host is involved, and this seems to be wholly or partly absent in the case of *Ollulanis*. This parasite differs in several important respects from other parasites, not only in its peculiar habitat, but in being viviparous, and in the larvæ completing their preliminary moults within the uterus of the female. It is accordingly not safe to generalise on analogy from other forms having different biological characters. Fülleborn has recently studied *Rhabditis bufonis*, a parasite of the lung of the frog, and he suggests that in this form some substance is produced which would inhibit the continuous development in the lungs. It is possible that such a substance is also produced in this form or otherwise there would be infections even higher than those observed. Or it might be that this substance would only be produced after an optimum concentration of adults in the stomach had been reached.

It is not possible either to prove or disprove either of these hypotheses at the present moment, and this cannot be done until all possibility of continuous auto-infection can be eliminated.

The development of the parasite inside the stomach has not yet been elucidated, but serial sections of parts of the stomach of several infected cats suggest the possibility of a development in the mucosa.

CONTROLS.—All the cats used in these experiments were obtained as kittens three to four months old from the same source. At the same time about twice this number was obtained for other experiments, and these animals were used to control the *Ollulanus* experiments. In no case was this parasite found in any of the control animals, and this makes it practically certain that the experimental cats were free from *Ollulanus* when fed. Thereafter they were confined to cages and accidental infection from outside sources rendered impossible.

The present conception of the life history of *Ollulanus tricuspis* is as follows. The egg hatches in the uterus and the larva which emerges moults *in situ* and its tail changes from a rounded to a typical tricuspid one. The second stage larva develops into a third stage which is found outside the female, but the exact period at which it leaves the mother is still unknown. This form leaves the stomach in the vomit and is swallowed by a new host, in which it develops into a fourth stage larva and finally the typical adult. Some part of this development seems to take place in the depths of the mucous membrane above the muscularis mucosa. It is possible that there are other methods whereby the infective larva may leave the host, but these have not yet been discovered.

The geographical distribution of *Ollulanus tricuspis* is not fully known. It was found in Germany by Leuckart and in Switzerland by Galli-Valerio. Cobbold also reported it from Britain, but there is no clear evidence that he ever actually saw this species, and probably his record should apply to *Aelurostrongylus abstrusus*. Hall records its presence from Washington, D.C., but it is not stated whether he is referring to the adult in the cat or the larva in the mouse. In the latter case, his record would, of course, refer to Müller's species. Neumann reports that, although he searched very carefully for *Ollulanus* in France, he was unable to find it.

The morphological and biological studies described in this article have occupied several years, and results have been published in a number of papers in the *Journal of Helminthology*. These papers are listed below and contain full accounts of the experiments together with references to all the previous publications.

Jl. Helm. I, 1923, 157-160.

" IV, 1926, 53-60.

" V, 1927, 1-24.

Jl. Helm. V, 1927, 55-66.

" V, 1927, 67-80.

" VI, 1928, 165-166.

The illustrations are reduced from plates in these articles by kind permission of the Editor of the *Journal of Helminthology*.

Clinical Articles

The Treatment of Persistent Nasal Catarrh in Horses by Means of Autogenous Vaccines.

By MAJOR A. A. PRYER, D.S.O., R.A.V.C.,
Royal Army Veterinary School, Aldershot.

THE preparation of autogenous vaccines, for the relief of persistent nasal catarrh in horses, has been carried on as a routine procedure at the Royal Army Veterinary School, Aldershot, for six and a half years.

The results obtained from September, 1922, to September, 1926, have been published by Lawrence in the *Veterinary Record* of November 10th, 1923, and by Davenport in the *VETERINARY JOURNAL* for February, 1927.

Davenport proceeded on foreign service in September, 1927, at a time when the records of many cases, treated with vaccines of his manufacture, were outstanding and consequently he was unable to carry out a scrutiny of the results obtained. Therefore it is to the author that the task has fallen of summarising these results, together with those secured with vaccines prepared since Davenport's departure.

During the period September 21st, 1926, to December 31st, 1928, 75 vaccines were prepared; no essential alteration has been made in the mode of preparation and administration described in Davenport's article referred to above.

The bacteriological findings show some variation, in that streptococci, either pure or in association with other organisms, were recovered in only 29 per cent. of cases instead of the 65 per cent. of cases recorded by Davenport.

This may be attributable to the fact that the bulk of Davenport's cases occurred at a remount depot and many of them were probably cases of atypical strangles.

The present series of cases were distributed over many different military stations and only in a few of them was the affliction clinically suggestive of a strangles infection.

It has been noticed further that in those cases in which streptococci were present, and were incorporated in the vaccine, the results obtained were uniformly inferior to those secured with vaccines prepared from swabs in which streptococci were not detected. The author has been struck so forcibly by this fact that he has come to regard the finding of streptococci, either when examining microscopically a smear made from the primary swab, or when recovering them in culture, as an

indication that vaccine therapy will not be attended by the same degree of success that has been found to follow the employment of vaccines from which they are absent. It appears possible that there may be some connection between this finding and the well-known difficulty of evoking an immunity response to the various strains of streptococci recovered from cases of strangles.

The following is a summary of the organisms which were isolated from the swabs and which were incorporated in the vaccines :—

Staphylococci in association with diplococci	in 25 per cent. of cases.
" " " streptococci	" 18 " " "
Staphylococci in association with diplococci	
and a small gram negative bacillus ..	" 14 " " "
Staphylococci in association with diplococci	
and streptococci	" 11 " " "
Staphylococci in association with a small	
Gram negative bacillus	" 9 " " "
Staphylococci only	" 7 " " "
Staphylococci in association with strepto-	
cocci and a small gram negative bacillus	" 5 " " "
Staphylococci in association with diplococci	
and a cocco bacillus	" 4 " " "
Other combinations of the above-mentioned	
organisms	" 7 " " "

The time and labour necessary for classifying, with precision, all the organisms encountered, has not been available, but the morphological and cultural characteristics observed showed considerable constancy throughout the series.

It is obviously impossible to claim that all the organisms recovered were pathogenic since an exhaustive investigation of the bacterial flora of the nasal chambers of the healthy horse would be an essential preliminary to any such assumption; all that one can say is that their incorporation in vaccines yielded gratifying results.

Results.

In 58 of the 75 cases in which a vaccine was prepared, full particulars of the results obtained were returned to the laboratory; in four cases the vaccine was not used owing to the patient having died or recovered before it was received; in 13 cases the results of treatment were not communicated. Details of the 58 cases which were available to assess the value of the treatment are given in the "Appendix," and it is felt that they merit the following comments :—

(1) In 56 cases, cures, attributed to the vaccine, were reported by

veterinary officers working independently in different garrisons in the United Kingdom and Rhineland.

(2) Of the 56 cases treated successfully, two were reported as cured after the administration of two doses of vaccine. They had been under other treatment for 51 and 28 days respectively prior to the applications of vaccine therapy; the nasal discharge ceased and did not recur, in one case nine days and in the other cases 11 days, after administering the first dose of vaccine.

In four cases recovery occurred after giving three doses of vaccine; the subjects had been under treatment previously for 33, 56, 41 and 19 days respectively; corresponding recovery was reported at the 14th, 9th (in two cases) and 16th days after administering the first dose of vaccine.

(3) Of the 50 cases treated with the full course of four doses of vaccine:—

Thirty-six, or 72 per cent., recovered between 14 and 21 days with an average of just under 18 days. This is without regard to the number of days the cases had been under treatment prior to the application of vaccine therapy, varying as it did from 187 days to 13 days with an average of 55 days.

Fourteen, or 28 per cent., recovered between 22 and 44 days, with an average of 28 days; they had been under treatment previously for periods ranging from 135 days to 17 days with an average of 64 days.

The fact that recovery occurred in a high proportion of cases about the 18th day is reconcilable to the anti-body production that should follow the administration of four doses of an autogenous vaccine at intervals of four to five days.

As far as the remaining cases are concerned, i.e. those in which recovery did not occur until four or more weeks had elapsed, it may be contended that cure was attributable to natural forces rather than to the employment of the vaccine. Whilst it is difficult to refute such an assertion, mention must be made of the fact that in some of these cases the merits of the vaccine are displayed in a disadvantageous light owing to the varying interpretation used in determining the date cured. The most a vaccine can be expected to accomplish is the removal of the nasal discharge and associated symptoms; this was realised pretty generally and most of the records were compiled on this basis. It has been found, however, that in some cases the date on which the animal was shown as cured was not that on which the nasal discharge ceased, but that on which the patient was discharged to actual duty. Thus the utility of the vaccine has been rendered less apparent by the retention under treatment of patients for debility, etc., long after the vaccine had performed its legitimate task. Persistent

nasal catarrh is encountered more frequently in Army horses than in those employed in other spheres and the problem of its cure is of chief interest to the military veterinarian. It is considered that sufficient evidence has been accumulated to indicate that the condition is usually removed more speedily by vaccine therapy than by other methods of treatment.

In conclusion, it may be said that whilst the relation between persistent nasal catarrh and defective wind is largely conjectural, it seems possible that the more prompt and more general application of vaccine treatment might be followed by a diminution of the number of animals which become ineffective from "roaring" and "whistling."

The acknowledgements of the author are due to Mr. J. D. G. Crisp, Senior Laboratory Assistant at the Royal Army Veterinary School, for much capable and painstaking work in connection with the preparation of the vaccines and the compilation of records.

Appendix.

1	2	3	4	5	6	7
Laboratory No.	Date Admitted to Hospital for Catarrh.	Date First Dose of Vaccine was given	Date Discharged from Hospital Cured.	No. of Days Sick before Vaccine Treatment was given.	No. of Days Remaining in Hospital after First Dose of Vaccine was given.	No. of Doses of Vaccine Given.
1510	1-9-26	22-10-26	30-10-26	51	9	2
1513	14-10-26	29-10-26	16-12-26	15	19	4
1516	26-10-26	12-11-26	6-12-26	17	26	4
1533	28-10-26	2-12-26	19-12-26	34	18	4
1534	9-9-26	6-12-26	—	83	Failure	4
1538	15-10-26	13-12-26	27-12-26	59	15	4
1544	13-9-26	26-12-26	7-2-27	135	44	4
1550	22-11-26	20-1-27	6-2-27	59	18	4
1552	3-11-26	8-2-27	28-2-27	97	20	4
1556	20-12-26	1-2-27	24-2-27	43	24	4
1561	15-12-26	8-2-27	23-3-27	55	44	4
1570	5-1-27	11-2-27	28-2-27	37	18	4
1577	19-8-26	25-2-27	16-3-27	187	20	4
1606	22-11-26	16-3-27	7-4-27	114	23	4
1624	2-3-27	4-4-27	17-4-27	33	14	3
1740	15-3-27	27-5-27	15-6-27	73	20	4
1741	31-3-27	27-5-27	25-6-27	57	29	4
1757	27-4-27	31-5-27	13-6-27	34	14	4
1815	6-4-27	31-5-27	20-6-27	55	21	4
1875	25-4-27	1-6-27	15-6-27	48	15	4
1876	11-4-27	1-6-27	25-6-27	51	25	4

1	2	3	4	5	6	7
Laboratory No.	Date Admitted to Hospital for Catarrh.	Date First Dose of Vaccine was given.	Date Discharged from Hospital Cured.	No. of Days Sick before Vaccine Treatment was given.	No. of Days Remaining in Hospital after First Dose of Vaccine was given.	No. of Doses of Vaccine Given.
1877	24-4-27	31-5-27	10-6-27	37	11	2
1973	23-5-27	20-6-27	5-7-27	28	16	4
2017	17-5-27	20-6-27	5-7-27	34	16	4
2077	25-2-27	8-7-27	25-7-27	67	18	4
2184	28-5-27	3-8-27	24-8-27	68	22	4
2186	24-5-27	28-8-27	31-8-27	70	29	4
2303	26-2-27	25-8-27	12-9-27	84	19	4
2349	8-7-27	5-9-27	22-9-27	59	18	4
2350	7-2-27	5-9-27	30-9-27	60	26	4
2351	2-6-27	5-9-27	22-9-27	96	18	4
2353	20-6-27	5-9-27	22-9-27	77	18	4
2354	21-7-27	5-9-27	22-9-27	46	17	4
2355	16-8-27	5-9-27		20	Failure	4
2380	20-7-27	22-9-27	5-10-27	64	14	4
2381	25-6-27	22-9-27	7-10-27	80	16	4
2382	22-7-27	22-9-27	5-10-27	62	14	4
2383	5-9-27	22-9-27	5-10-27	16	14	4
2396	27-7-27	22-9-27	30-9-27	56	9	3
2397	12-8-27	12-9-27	30-9-27	41	9	3
2502	17-8-27	10-10-27	24-10-27	54	15	4
2503	13-8-27	10-10-27	28-10-27	58	19	4
2619	20-8-27	9-11-27	28-11-27	20	20	4
2620	23-9-27	9-11-27	28-11-27	48	20	4
2621	22-9-27	9-11-27	30-11-27	48	22	4
2622	19-9-27	9-11-27	28-11-27	51	20	4
2927	8-12-27	20-12-27	8-1-28	13	20	4
2828	5-12-27	20-12-27	5-1-28	16	17	4
3021	20-12-27	26-1-28	14-2-28	37	20	4
3022	22-12-27	20-1-28	4-2-28	19	16	3
3403	10-5-28	10-7-28	4-8-28	61	26	4
3404	15-5-28	10-7-28	8-8-28	56	30	4
3514	2-7-28	6-9-28	25-9-28	66	20	4
3515	12-7-28	6-9-28	28-9-28	56	23	4
3526	19-7-28	11-9-28	27-9-28	54	17	4
3527	22-8-28	11-9-28	27-9-28	20	17	4
3543	17-7-28	28-9-28	17-10-28	73	20	4
3601	27-8-28	22-10-28	6-11-28	56	16	4

Operation for the Cure of Inguinal Hernia in the Dog.

By R. HUDSON, F.R.C.V.S.,

Retford.

WHEN castrating of the animal may be carried out, the operation for the cure of inguinal hernia is a simple matter, but where the testicles are to be saved it becomes a much more difficult and serious problem.

The subject in this case was a Pekingese which had won many prizes and was valuable for stud purposes. Therefore, the owner was anxious that the testicles should be saved. To have castrated him would have rendered him ineligible for Shows.

He was about 15 months old and the hernia on one side formed a sac of the scrotum about two inches wide by four inches long, and the testicle could only be felt with difficulty. On the other side the hernia was not observed until some days after the previous side had been operated on, when it was found to fill out the neck of the sac for about one inch. It became much worse later on.

Operation No. 1.

It was intended to close the abdominal opening and to narrow the neck of the sac by sutures, leaving sufficient room for the spermatic artery and vas deferens. The inguinal opening was about three-quarters of an inch long and easily admitted my little finger.

After fasting for 24 hours, the patient was given one grain of morphia, and when sufficiently under its influence was placed on the operating table. The seat of the operation was prepared by washing, shaving, dressing with Tr. Iodine and about 20 minims of two and a half per cent. Solution of Cocain injected over the inguinal opening.

The hernia having been reduced an incision about one and a half inches long was made over the opening and dissection carried out until the neck of the sac was exposed, fat and connective tissue being removed. The wall of the sac was very thin, the spermatic artery and vas deferens being clearly seen through it.

The edges of the abdominal opening were very thin and ill-defined and to infold the wall of the sac and suture the edge of the ring presented considerable difficulty.

Intestines kept falling into the sac and they, along with the

spermatic artery and vas deferens, were always in danger of being included in the sutures.

However, I managed to place five or six sutures and hoped for the best.

The cavity was swabbed out, the skin sutured and a dressing applied under a bandage.

On the fourth day the wound was found to be suppurating and some sutures were removed, the cavity being swabbed out and lightly packed; also, the other side was noticed to be bigger than normal in the neighbourhood of the inguinal ring.

In about 10 days the wound was almost healed, but a suspicious swelling began to appear at the site of operation, and the swelling on the other side increased.

It was evident that the operation had been a failure.

Second Operation.

The wound having practically healed and the underlying tissues become fairly elastic, the patient was prepared as before.

I had previously sutured the abdominal opening with a small curved needle, which was difficult to handle. I now had a small McEwan's needle which was much better to guide and work with.

On the operated side the neck of the sac was difficult to locate owing to newly-formed tissue and in the attempt I penetrated it and so had trouble with escaping intestines.

However, I managed to get my sutures into position better than in the first attempt and closed the abdominal opening more satisfactorily, leaving room for the artery and vas deferens. Sutures were also placed along the neck of the sac.

The other side was operated on in the same way, the only difference being that there was more fat and tissue over the inguinal opening.

In placing the skin sutures they were carried through underlying tissue where possible.

The wounds were dressed with Iodoform and Boracic Acid, and a pad of wool was held in position by a bandage.

The wounds healed without suppuration, except a small cavity at the end of one of them. This did not give much trouble.

After about a fortnight there was a suspicious swelling on one side; but the owner was advised to keep the wool and bandage applied for three or four weeks and lately, about three months after the operation, I hear that the patient is cured and being used for stud purposes.

Crib Biting Operation.

By FRANK CHAMBERS, O.B.E., F.R.C.V.S.,

Wolverhampton.

ON July 31st, 1928, in conjunction with Mr. K. Miles, M.R.C.V.S., I operated on a seven-year-old thoroughbred mare, "Carcavet" (by Sunbright ex Carbide). This mare was a very bad cribber, so much so that the owner could never get her into good condition. She ran third in an open race at a point-to-point in March, 1928. The owner stated that it was this lack of condition that stopped her from winning races. The mare was anaesthetised by the administration of two ounces of chloralhydrate into the jugular vein. The anaesthesia was not absolute, but it was rendered complete by the administration of a very small quantity of chloroform. The operation was carried out as originated by Prof. Forssell, but it was made difficult by the presence of much inflammatory tissue underneath the skin and around the muscles. This inflammatory exudate had been caused by the constant wearing of a leather strap around the neck.

A large amount of muscle from each individual belly was taken away and every one was dissected carefully out to its anterior attachment, and removed from this attachment. The hæmorrhage was not very great, but the subcutaneous vessels gave a certain amount of trouble. The wound healed by first intention and was completely closed and firm by August 12th. A small secondary abscess appeared on September 12th. This was evacuated and soon healed up. Conditioning commenced about the middle of August and she was hunted up to the date of sale. The owner in response to an inquiry about the mare writes as follows:—

" 'Carcavet' cribbed from birth and her dam also cribs. She tried to crib the first time she was loose after the operation, but only once, as it apparently hurt her, so she never attempted it for several weeks, when for a period of a few days she again tried. It seemed to give her no satisfaction, so she gave it up entirely. She went lame with a ringbone and was subsequently sold to her breeder as cured of cribbing. That was at the end of November and as nothing has been heard it is obvious that she has not cribbed since sold. Anyway she completely gave it up in the middle of September until sold. She put on wonderful condition and looked as she never looked before."

Arsenical Poisoning.

By H. G. LAMONT, B.Sc., M.R.C.V.S.,

Ministry of Agriculture, Northern Ireland, Belfast.

IN December, 1927, the writer was called upon to investigate a series of mysterious deaths which had occurred on a farm.

Two local veterinary surgeons concerned in the case supplied the following history of the "outbreak."

On December 24th the owner was driving a pony to the market when he noticed it was dull. The same night it developed acute diarrhoea and "loss of power" due either to paralysis or exhaustion. It died the following morning.

A heifer also became ill with similar symptoms on December 24th and died next day.

On December 25th a cow and a second heifer refused food, were straining and showed diarrhoea and marked weakness. These animals died on December 26th. *Post-mortem* examination of the cow by a local veterinarian revealed only a yellow coloration of the liver.

On December 26th a third heifer was off feed and was found dead at 11 a.m.

On December 27th two cows developed similar symptoms to the previous cases, one dying in 13 hours and the other in 36 hours. No rise in temperature was observed in any of the animals.

On December 29th the writer made a *post-mortem* examination of the two cows last mentioned.

The carcasses were well nourished and showed externally evidence of diarrhoea and eversion of the anus. There was a slight suspicion of blood in the faeces. Anthrax was negatived by microscopical examination.

Similar lesions were observed in both cases. The mucous membrane of the abomasum was acutely inflamed and eroded, especially on the free margin of the folds. Ecchymoses and extravasations were present in the stomach and also in the small intestine which showed acute enteritis. A peculiar feature was that several feet of the small intestine would exhibit evidence of marked irritation, while the succeeding few feet would be comparatively free of inflammation.

The liver was of a yellowish colour, such as is associated with acute yellow atrophy. Small hæmorrhages were noted throughout the substance of this organ, and in the spleen and kidneys, which were in a state of fatty degeneration.

A diagnosis of acute irritant poisoning, probably arsenical, was made.

Inquiry revealed that all the animals had been watered from one

tank. While the owner admitted dipping sheep in this tank in September, he was emphatic that it had been carefully washed out. Examination of the tank by the writer, however, showed a sediment such as is seen with Cooper's dip.

A sample of the tank water and portions of the gastro-intestinal tract were submitted to an analyst, who reported that arsenic was present in all cases.

A baffling feature of the case was that animals had been watered from the tank from September to December without any ill-effect. It transpired afterwards that arsenic had been re-introduced into the tank by a careless servant boy who, before watering the pony, had washed in the tank a bucket containing some sheep dip.

None of the animals showed salivation or acute colic, as is usually seen in acute arsenical poisoning.

Translations

"La Maladie de Düren." Some Cases of Poisoning in Cattle of Obscure Origin but Usually Ascribed to the Ingestion of Harmful Foods.*

By PROFESSOR V. ROBIN,

Alfort Veterinary School, Paris.

CASES of poisoning in cattle, in which as yet little is known as to their etiology, appear to be more frequent at the present day than heretofore, and the author ascribes this tentatively to the use of greater quantities of industrial products and exotic plants. Such cases are difficult of study, as their clinical manifestation is complex, and chemical and experimental research is often at a loss to separate a specific poison or even establish its presence.

The author describes the more important outbreaks of such poisoning in recent years, and discusses the articles which have been devoted to them in veterinary literature.

He first deals with the "Maladie de Düren," so named after the original centre in which the outbreak was noticed, but which later spread to Holland, Belgium, and the west of Germany. All of the many observers agree that young animals and especially cows in milk are the most frequent victims. There seems to be little tendency for the disease to diffuse among the animals, and usually only one or

* *Revue Générale de Médecine Vétérinaire.* July, 1928.

two are ill at the same time, deaths succeeding each other at intervals of from three to ten days. On an average only 10 per cent. die in the same stables.

The symptoms vary slightly in different authors' accounts, but can be summarised as follows: The onset is often rapid, beginning with great diminution of appetite, muscular tremors, and a rectal temperature of 40-41° C. (104-106° F.); the animal is downcast, with signs of muscular weakness in some cases, and even parietic trouble. In a few hours there is considerable hæmorrhage from the nose, and this may sometimes be the first symptom observed; hæmorrhage then occurs elsewhere, the secretion of milk is reduced, and the milk is of a distinct pink colour. Finally, respiration is accelerated and difficult; the pulse weakens and becomes irregular, and the animal falls to the ground, dying usually within three days. Many hypotheses were put forward as to the cause of these deaths, and at first it was supposed that the trouble was of bacterial origin. Finally, however, thanks to the work of Lothes and Profé, the cause was found to be the feeding of soya meal, the symptoms being in every way similar to those described by Stockman in 1916.

After describing the apparently irregular way in which soya meal produces this illness, and the various explanations which have been proposed, the author goes on to show by means of examples that these are not the only cases of alimentary intoxication in which hæmorrhage has been observed.

Such, for instance, are the cases observed by Kerdiles in which the cause of similar hæmorrhage, etc., was fern (*P-teris aquilina*), and those reported by numerous observers and finally shown to be due to *Ferula Communis*.

Parasitic Toxæmia in Lambs. Acute Coccidiosis and Enzootic Paraplegia.*

By DR. H. CARRÉ,

Alfort Veterinary School, Paris.

WITH a few exceptions, affections depending directly on zoological parasites are chronic in nature.

Even considerable infestation, at least in the adult, seldom provokes violent reactions; local lesions are set up slowly and steadily, and the more or less apparent effect on the general health is attained progressively.

In the adult sheep, chronic parasitic infestations end usually in pronounced anæmia or cachexy (distomosis, strongylosis).

* *Bulletin de l'Académie Vétérinaire de France.* April, 1928.

The pathogenic function of parasites is admittedly multiple ; local irritant action, suppressing wholly or in part the functioning of an essential organ ; absorption of red corpuscles ; and toxic action, but difficult of control.

The cases which we describe are of quite a different type, and the sole reason of this difference lies in the youth of the infested animals.

Up to the present, coccidiosis in the sheep (Moussu and Marotel) is described as anæmia of slow development, often confused with the other parasitic affections, and found solely in animals at least a few months old and always after weaning.

Post-mortem examination reveals only the ordinary lesions of cachexy ; limpid non-inflammatory exudates are found.

The small intestine, the only part showing lesions, appears speckled with small whitish spots, easily visible by transparence, composed of collections of parasites.

This description is certainly exact, but is only applicable to animals of a certain age. In the frequent cases of coccidiosis I have met with, I have never been able to find the limited lesions described by Moussu and Marotel. My observations were carried out only on lambs one to two months old, and thus before being weaned.

In lambs coccidiosis takes on a special form, remarkable for the speed of evolution, peculiarity of the symptoms, the extent of the lesions, and finally by the abundance and exclusive presence of coccidia.

At the beginning of the infestation of the flock, when the lambs were from one to two months old, a few of them were found dead without any sign of illness being noticed. A long inspection of the lambs showed that some walked with difficulty and fell without being able to get up again. Simple palpation of the abdomen caused plaintive groaning. No diarrhoea, respiration 70-80 and discordant, tumultuous heart beats.

The animal remained stretched out a few hours with occasional movements ; a little frothy saliva appeared on the lips, and death ensued.

The skin being removed, the animal appeared normal ; no exudation, no lesion of the heart or lungs in spite of the intense symptoms.

The small intestine, on a more or less extended area, was pale, rosy or yellowish ; the vascular system was well defined at the region of the large curve. Taken between the fingers it gave an impression of fullness, and was firm and rigid.

Tularemia.

By M. A. MARTIN.

La Presse médicale in December last drew the attention of doctors to a disease transmissible to man by the wild rabbit. The *Centralblatt für Bakteriologie* published in January two articles dealing with an analogous affection but arising from the hare. Like observations have been made lately in America and Japan. Two cases in man have been observed in London. It will, therefore, not be without interest to devote a few lines to this question. The malady caused by the wild rabbit has been called "Tularemia," from the district of Tulare in California where it was discovered in 1912. It declares itself in man by fever 104° F., at first continuous, then with matutinal remissions, with a general grave condition, accompanied by local symptoms; inflammation of the lymphatic glands of the region which has been in contact with the affected animal (cubital and axillary most often); these are enlarged and slightly painful on pressure; suppuration of chaps or erosions on the hand or fingers. The evolution is long and while the sick person may get up at the end of eight or ten days, he remains weak and listless for six months or even a year. The glands only decrease in size very slowly and suppurate in half the cases; a narrow orifice forms whence pus flows, and its persistence may cause suspicion of tuberculous adenitis. Tularemia confers immunity to man; it is relatively benign and only few cases of death have been noted.

In the absence of information on the circumstances in which the illness has arisen, the doctor thinks of influenza, or typhoid fever, and later from the glandular reactions of syphilis, tuberculosis or plague. The man in Japan contaminated himself from wild rabbits at the end of autumn to beginning of spring. In America wild rabbits in a kind of underground caused the malady. The domestic rabbit escapes infection. In this country tularemia is transmitted from rabbit to rabbit by a tick and by the louse of this rodent. Experimentally it has been transmitted to the guinea-pig, white mice by the flea of the mouse, the lice and bed bugs. It is transmitted to man by the agency of biting flies, chiefly *Chrysops discalis*, by ticks and also—a curious point in this malady—by mammal contact of the blood or viscera of affected animals. In Japan this last method alone was noticed. The causal animals are sometimes ill or appear weak, but sometimes they are killed or shot, and show no ailment whatever.

Observations made with great care by Japanese doctors show without doubt that human contamination occurs through contact.

A person may be affected a few days after skinning a rabbit ; several people may eat a rabbit without ailing, only those who skin or prepare it are affected. Sometimes the consumption of these animals occasions slight troubles. There is no need of apparent solution of continuity of the skin even for creating an easy way of access for the virus ; simple contact suffices and transcutaneous penetration is realised. A Japanese doctor, Ohara, had his wife affected, the back of the hand being rubbed with blood and serosity taken aseptically from a dead rabbit. In spite of a soaping of the region 20 minutes afterwards, the patient who submitted heroically to this experience, contracted tularemia and had to submit to surgical extirpation of the glands of the left armpit, which suppurated.

One can equally reproduce tularemia in a guinea-pig by soiling the skin with the fluid from an affected spleen, and cases have been observed, contracted at the laboratory under the form of typhoid without local lymphatic reactions, the naked hands having been contaminated from ailing autopsied animals.

The pathogenic agent of American tularemia is a small non-motile microbe, not taking Gram, the *Bacterium tularense*. It is inoculable to the rabbit, guinea-pig and white mouse, and probably transmissible in series. The two maladies, American and Japanese, have been proved experimentally to be identical. This malady seems to be epizootic in wild rabbits at times and every three, four or 10 years, in certain mountainous regions of Japan, these rodents die in large numbers.

* * *

Three Japanese savants, Professor Aoki and Doctors Kondo and Tazawa have studied a malady transmitted to man through a hare under the same conditions as tularemia ; but due to a filterable virus. It appears only to exist in the northern provinces of the Isle of Hondo and not in middle and southern Japan. In the northern regions the hunters know well of this human contamination from manipulation without care of hares killed, and declare that one must avoid touching the "white hypertrophied mass" of the hares, i.e. the glands. The blood is virulent. The virus of the hare appears capable of passing through the skin of the guinea-pig and probably the human skin. Two Japanese doctors were severely affected accidentally by manipulating organs and virulent tissues. The malady has been observed in hares which have been found in the forests weak and ill, and also in those preparing hares for the table, whilst those who have eaten the flesh remain unaffected. The symptoms of this malady in man are those of tularemia. What is the nature of the disease of hares ? Japanese authors know nothing of it, never having had affected subjects in hand.

The filtrable virus is inoculable to the rabbit, guinea-pig and rat. Guinea-pigs are very sensitive and die after having presented typical symptoms, fever, glandular hypertrophy. The rabbit is much more resistant and rarely dies. Here one observes high fever with or without enlarged glands. Rats always die. The virus is little resistant to heat (four days at 98·6° F.), but very resistant to cold.

Alimentary Polyneuritis in Young Dogs (Beri-Beri).*

By PROFESSOR J. POENARU,

of the Faculty of Veterinary Medicine of Bucharest.

POLYNEURITIS is better known in human medicine, and especially in countries where the population feeds almost entirely on decorticated rice, or in regions with a defective food system.

In veterinary medicine the only well-known cases are those studied experimentally by the feeding of decorticated cereals or sterilised food.

Eijkmann has observed polyneuritis in fowls following the use of decorticated rice; and Fujitani in pigeons and parrots.

Shiga and Kusma, Schaumann, and Hoest, have studied polyneuritis in rabbits and guinea-pigs, and MacCullum, Funk, and Weil and Mouriquand, in mice.

Bergeon, by feeding dogs with decorticated rice, has provoked paralysis analogous to that of beri-beri.

Glyns, and Weil and Mouriquand, have shown that not only rice, but other cereals, such as barley or maize, if decorticated, produce in certain cases polyneuritis. For a lack of factor B or anti-beri-beri vitamin to occur, the food must be either very simple in kind, or else it must be too cooked or in bad condition.

During 1927 we were able to establish the presence of polyneuritis in two young dogs which had been weaned early and then fed on waste material which consisted largely of "mâmâliga," or decorticated maize meal boiled up. Symptoms of paralysis appeared 35 days after weaning. The puppies staggered as they walked, and finally, finding they could not walk they dragged themselves along on their stomachs. The muscles reacted to the electric current, but only in a weakly fashion. Parts of the body maintained their full reactivity, and in the limbs the sensitiveness diminished as the extremities were approached. Paralysis was symmetrical both in the fore and the hind limbs. The muscles of the face were normal, temperature normal

* *Bulletin de l'Académie Vétérinaire de France.* April 1928.

and appetite retained. The limbs were the only parts where functional trouble was noticed.

The first dog was two months old, and after being put on a diet of raw meat, milk and bread, was almost completely cured. Whereas its legs had been relaxed and remote from the body, it walked quite well at the age of four months, and ran and jumped; but, when walking, it not only rested on the sole of the foot, but on the metacarpals and metatarsus, i.e. on the whole foot.

The other puppy was destroyed when ill, and its nervous system was examined after being fixed with osmic acid. It was found that the extremities of the nerves of the foot muscles contained some degenerated nerve fibres.

I am therefore of the opinion that alimentary polyneuritis occurs frequently in puppies kept under defective hygienic conditions and with defective food, but that the trouble may be confused with other types of paralysis or with rachitism. Good food containing vitamin B effects a cure.

Discussion.

Dr. Mouquet said that during the past 10 years he had been drawing the attention of practitioners to the importance of qualitatively insufficient food in the genesis of various pathological conditions of obscure etiology. He pointed out that if the rations of the puppies under discussion were made up of the maize and kitchen refuse of little food value, it seemed probable to him that other deficiency troubles would have set in in addition to those which could be ascribed to a lack of vitamin B. For this reason he suggested that a better description would have been: "Deficiency disease combined with polyneuritis."

Ethyl Chloride as Anæsthetic for the Cat*

By DR. E. DECHAMBRE.

MANY of our colleagues hesitate to carry out small operations on the cat merely because it is an animal difficult and even dangerous to control. The lightest operation may become a source of dangerous wounds for the operator or his assistants. It is for that very reason, namely, that we have on several occasions had our assistants seriously wounded, that we decided to search for a practical method of intervention without danger either to the operator or the subject.

In spite of the cat's reputation of being unable to support anæsthesia easily, we thought that this was the most promising line of attack.

We were much struck by the medical statistics concerning

**Bulletin de l'Académie Vétérinaire de France*, June, 1928.

anæsthesia with ethyl chloride, which show death to be exceptional (Seitz, among others, reporting 16,000 cases of its use, without a single fatality), and we tried to find out whether this product had not been tried in veterinary medicine. The most useful reference we found was in the vade-mecum of MM. Mollereau, Porcher, and Nicholas, where it is simply stated that, according to M. Auger, the use of ethyl chloride is the best method in the case of the cat.

But in practice we found serious difficulties, which made us understand why others had given up this method. *Indeed, it is indispensable that the gas be breathed almost pure, without admixture of air.*

The use of a mask is almost impossible in the case of the cat. The animal usually resists violently, and water vapour rapidly condenses on the compress, which soon becomes useless. It is practically impossible to obtain anæsthesia in this way.

The use of a box $60 \times 40 \times 40$ cm. ($24 \times 16 \times 16$ in.) did not put a cat to sleep with 50 grammes of ethyl chloride.

In order to reduce to a minimum the volume of air contained in the box around the cat, we constructed, after several experiments, a box of rather curious shape, but answering well to the object in view. It is a little longer than the body of a cat, and of trapezoidal section. Its front end is just big enough for the cat to introduce its head, and is closed by a sheet of glass thoroughly sealed to the box, with a small hole for the introduction of the ethyl chloride; the other end (by which the animal enters) is just big enough for the hind quarters of the cat, and can be closed by a door.

The animals can be easily placed in the box, as the way seeming clear, they enter readily enough, and once they are in in part, they cannot turn round. They are thus obliged to breathe in a very confined space, and anæsthesia is rapidly obtained with a few grammes of ethyl chloride (3 gr. are sometimes enough; 10 are a maximum).

Ethyl chloride is put up for sale in tubes with automatic opening, and shutting devices which allow them to be turned on and off instantaneously. Other models can be regulated to deliver the gas more or less rapidly. But anæsthesia is produced so rapidly that, at first, and until one is used to the method, it is preferable to use tubes which give off the gas slowly.

Anæsthesia takes place without any period of excitement or any danger of laryngo-reflex syncope; more or less pronounced purring marks the point where it is complete with muscular resolution. At that moment the animal is removed from the box and operated on rapidly. The duration of anæsthesia is short and the awakening very sudden. However, we have obtained eight minutes' complete anæsthesia on a healthy cat with 10 grammes of ethyl chloride. More-

over, if the operation is on the hindquarters, the head can be left in the box, thus prolonging the period of anæsthesia.

Most minor operations can be carried out with this anæsthetic—castration of big cats, lancing of abscesses or hematomas of the ear, avulsion of teeth, even the eye, etc.

If the dose of anæsthetic is rather high, the respiratory movements may stop. As a rule they resume spontaneously in a few seconds. If they fail to do so, it is only necessary to introduce into the larynx an insufflation-tube and to provoke the laryngeal reflex, when respiration is soon re-established.

Sometimes at the moment of awakening there are signs of excitement. For this reason it is prudent to allow the subject to come to in a large basket or cage. Care must be taken, however, that it be placed in such a way that respiration is not hindered. The animal returns to normal in a few minutes.

For several years we have regularly employed ethyl chloride in connection with the cat, and have operated on several hundreds without a single fatal accident. Some subjects have been put to sleep several times, either on the same day or several days running. One of them was treated 10 times in three months, sometimes after fasting and sometimes not. None of them died from the effects of anæsthesia.

In our opinion, with this method, ethyl chloride (which has long been recognised as harmless) will enter into current practice, and will allow our colleagues to carry out on the cat a number of operations which they had, with good cause, hesitated to undertake up to the present.

Clinical Studies on the Toxicity of Cyanogenetic Linseed Cake.

By DR. QUENTIN.

Bulletin de l'Académie Vétérinaire de France, May, 1928.

The clinical characteristics of poisoning by cyanogenetic linseed cake as observed in the sheep and ox are as follows:—

1. General effects of a more or less serious nature—

On the nervous system, trembling, sleepiness, stupor, weakness, staggering, fall.

On the respiratory system, special dyspnoea, with arrested breathing if the poisoning is acute, and with irregular acceleration of the breath in less acute cases.

On the digestive system, varying from simple to profuse and abundant diarrhoea.

2. Rapid appearance of symptoms after starting on a new lot of cake (usually eight or nine days after).

3. Return to normal by stopping the ration of suspected cake in cases where the trouble is checked before becoming very serious.

In advanced cases the well-known antidotes can be administered with advantage, namely, solutions of ferrous sulphate and sodium carbonate, officinal hydrogen peroxide diluted in five volumes of water, cobalt nitrate and (according to Drs. Richart and Brioux) sugar or treacle.

Post-mortem examination revealed stomachs normal except the fourth, which was of dark red colour, with very congested mucus and red liquid contents; the intestine was similar to the fourth stomach, the colon also containing blood clots, slight change in the liver, kidneys and pancreas; the lungs were very congested with reddish brown parenchyma and sub-pleural emphysema; heart normal with reddish endocardium speckled with hæmorrhagic spots.

As soon as this form of poisoning is suspected its diagnosis is easy. To confirm it a casual examination of the cake is insufficient, but resort must be made to chemical analysis. If prussic acid is found the cake should be sent to a chemical or toxicological laboratory for an estimation of the percentage of poison present.

All cakes containing more than 0.04 per cent. have been found to cause accidents. These are more or less serious according to the percentage of prussic acid in the cake and to the total amount of cake eaten. With regard to the latter it must be remembered that out of a herd some animals will eat a much larger quantity than others.

In addition to the factors affecting poisoning mentioned above the rate at which the cyanogenetic glucoside (linamarine) in the cake breaks down to prussic acid is of great importance, and since water, particularly tepid water, favours this formation of prussic acid, its use in the preparation of the ration should be noted. Finally it has been observed that soft cakes are the least dangerous, and that the hard and very hard led to serious trouble.

The author agrees with the conclusions of Dr. Kohn-Abrest (1920), that until manufacturers destroy the enzyme (linase) in the cake by superheating or steaming, a law should be passed prohibiting the sale of cake yielding more than 0.008 per cent. of prussic acid.

Dr. Drouin, in discussing the paper suggested that the increasing occurrence of linseed poisoning was due to the alteration in the sources of supply, the pre-war Russian supply being now made up with material from the tropics.

Abstracts of Current Literature

Holstein, M. G.—A Case of Osteomalacia in the Dog.—*Bulletin de l'Académie Vétérinaire de France.* July, 1928, p. 288.

AFTER some general remarks on osteomalacia, the author remarks on the rarity of this malady in the dog and mentions cases which have been described in veterinary literature by Silling and Merny (1889), Morelli de Pise (1903), Hébrant and Antoine (1914), Liénaux and Huynen (1921).

A dog of the Groenendael breed, six months old, born in Belgium, sent to Paris at four months old, had been fed on soups, pastry and rice.

At the end of three weeks its owner noticed the dog to be weak, always lying about, mouth half open and eating with difficulty. The palate is tumefied and the face enlarged considerably.

At a clinical examination at the Alfort School the patient shows a deformed head, an enormous symmetrical swelling of the two maxillaries, the palatine arch much vaulted, the teeth displace outwardly and loose. The bones are soft and easily depressible. On the other hand, the bones of the body and limbs seem normal. Respiration is painful and very sonorous and death by asphyxia occurs in a few days.

The autopsy, apart from a cute nephritis only allows of finding alterations in the head bones. The bones are soft, can be cut with a knife, are transformed into fibrous tissue, greyish, elastic which fills up the sinuses and nasal cavities.

Histological examination shows the structure of osteosarcomas or ossifying sarcomas, there is no trace of calcareous salts, the osseous tissue is reduced to ossein, completely decalcified. One sees a fibroid tissue, some hæmorrhagic plaques.

The author diagnoses osteomalacia.

Monsieur Carougeau makes the following observations on the above. The author's interpretation would be indisputable if at the same time there had been lesions of the vertebral column and long bones. The integrity of these parts of the skeleton which in the horse are always affected with the bones of the head, leads to doubt and causes us to ask whether this is not a case of simple osteosarcoma.

[There seems to be little in current literature about osteomalacia in the dog. H. Gray, in Vol. II, Hoares System of Veterinary Medicine, p. 1331, considers it as not rare in the dog. Hutyra and Marek mention it as occurring naturally and being artificially produced.—G.M.]

Riedmüller, L., and Lutz, E.—Coccidiosis in Young Birds.—*Schweizer Archiv. f. Tierheilkunde*, Vol. 70, 1928, pp. 22-32.

THIRTY-TWO naturally infected chicks were divided into five groups. Group I, untreated controls; Group II, treated with sour full milk put before them in place of drinking water; Group III received one-quarter per cent. solution of creolin 30 to 50 minims daily with a catheter direct into the crop; Group IV received milk and creolin; Group V, the most severely affected birds, received creolin. The effect of the treatment was judged by increase of weight and diminution of voided coccidia. Creolin proved unsatisfactory. Sour full milk gave the most favourable results, the birds treated gaining on an average 225g. more than the controls and after 42 days 315g. more. Hygienic measures must, however, accompany this therapy.

Theiler and Robinson.—Parabotulism of Horses.—*Revue générale de méd. Vétérinaire*, April, 1927.

PARABOTULISM of the equidæ is brought about by an organism of the parabotulin type, *Clostridium parabotulinus equi*, whose morphological characteristics and points of culture simulate those of *Parabotulinum bovis*, the causal agent of "Lamsiekte."

The malady which affects horses and mules commences suddenly with an apyretic attack of paralysis of the locomotor system. It generally terminates in 24 to 48 hours by death from asphyxia. Cure may result after several weeks. There is no characteristic lesion at the autopsy.

The microbe which is the cause of the disease has been isolated from the body of a rat found in the rack of a stable where mules had been stricken with paralysis. Colonies of the pathogenic agent were obtained in symbiosis with non-sporulated microbes—of coccus type—were transplanted on media of chopped meat, and put in a stove for three days to allow the anærobes to sporulate. A temperature of 70 degrees for an hour then makes the coccus disappear and one has a culture of fine flaky texture characteristic of *Parabotulinus*. This is an immobile bacillus, generally associated with another bacillus, sometimes with several others in chains; stains well with the basic aniline dyes and takes Gram when it is young. The toxin develops on culture medium at 37 degrees and also at an outside temperature of 20 to 26 degrees. This toxin injected into horses or administered by the mouth produces the malady. The mule and the ass also are very sensible to subcutaneous inoculation of the filtrate of cultures. In bovines the paralytic phenomena are also produced, but more slowly. In the sheep and the goat paralysis of the locomotor system

is the principle symptom of the experimental malady. The spontaneous malady appears to be due to the ingestion of diet soiled by the poison of the toxigenic agent. This is different from the microbe of the paratuberculosis of bovines. The two species of animals have not the same sensibility to the toxin and antitoxin of "Lamsiekte" and the one does not protect against the toxin of the paratuberculosis of equines.

Gurini, A.—Genital Tuberculosis of the Cow.—*La Clinica Veterinaria*, Oct., 1927, pp. 604-612.

G. EXAMINED 300 tuberculous cows at the abattoir of which 52 were affected with generalised tuberculosis. Amongst these latter six showed lesions of the ovaries of the Fallopian tubes and cormia; one showed lesions of the left tube and of the anterior part of the cormia of the same side; three presented lesions of the ovaries, tubes, cormia and body of the uterus and vagina.

Observations made and facts known point to the following conclusions:—

(a) Genital tuberculosis of cows is almost always of secondary origin.

(b) Tuberculosis by extension of the lesions of the peritoneum across the tubes is the usual form encountered.

(c) Ascending infection by *Tuberculous vaginitis* was not demonstrable, and it seems hardly possible. Only Bertolini records this fact, and under special conditions due to intermediary infection by the Malpighi-Gärtner canals.

Sablayrolles, L.—Contribution to the Study of Hæmorrhagic Gastro-Enteritis of Carnivora.—*Role of Spirillæ*. Thesis Toulouse, 1928. *Revue Veterinaire*. November, 1928. Pp. 632 and 633.

FOR some years, spirochætes, very widespread protozoa, have been observed by numerous authors in dogs affected with hæmorrhagic gastro-enteritis, to such an extent that certain men have looked on it as a spirochætosis. Researches by the author lead him to the conclusion that the etiology of typhus of the dog is still unknown, and that those best informed have cause to consider it as an auto-intoxication. In 12 sick subjects the parasites have never been discovered in the urine, kidney, liver and spleen, and it has never been possible to transmit the malady to dogs by giving them renal, hepatic, tissue, or pounded spleen and intestine.

On the other hand, S. has found spirillæ in the intestinal tract of healthy dogs in 50 per cent. of cases examined. He thinks that these spirillæ can proliferate largely in certain circumstances, become

pathogenic and cause a *spirillary dysentery* in the dog, a sporadic affection of long duration, characterised by hæmorrhagic enteritis, with resultant anæmia and progressive emaciation leading to cachexia and death. This malady, rebellious to various drugs, declines and is cured by doses of 75 centigrams to 1 gramme of stovarsol per day.

The author has published a certain number of observations collected in the clinical service of the veterinary school of Toulouse, produced in a clear and precise style and illustrated with perfectly plain photographs.

Cacciari, N.—Traumatic Gastritis Caused by a Willow Branch.—

La Clinica Veterinaria 51, pages 127-128.

A SIX-MONTHS-OLD calf showed digestive disturbance, loss of appetite and irregular rumination. Examination showed temperature 103 $\frac{4}{5}$, meteorismus, faulty rumen movements, dejection and lassitude of the subject. After laxative treatment improvement occurred, yet in the neighbourhood of the xiphoid process of the sternum a round, fist-sized, warm, painful, doughy swelling appeared. After opening up a woody foreign body was felt in the abscess cavity. With the hand a blunt willow branch was drawn out. It was 10 inches long and quarter of an inch thick. In three weeks the fistula had healed up. After operation fever declined and normal digestion returned.

Kösler.—The Electric Stunning of Animals for Slaughter.—*Ztschr.*

f. Fleisch u Milchhyg, 38, 16, pp. 284 to 285.

By use of the electric current used for lighting at 110 to 120 volts, a series of actual electric stunnings of cattle were carried out in the Stuttgart abattoir. As an electrode a large copper plate was used, which was laid on the damped loin region, and a brass tube was put in the mouth like a bit. After putting on the current the animal suddenly sank down on its knees and laid flat on its side. Immediately after knocking off the current complete unconsciousness was established. After two or three minutes consciousness returned. After putting on the current for a few seconds complete unconsciousness again occurred. At this stage the *coup de grâce* was administered without any restraint of the animal, and without any signs of pain on its part. The whole procedure was over in a few minutes. As opposed to hitherto slaughter according to ritual this method is markedly more simple, and results in a considerable saving of time, quite apart from the better impression it produces on the laity. It is to be hoped that the Jews will adopt this plan. Then the matter of the painfulness of the knife stroke method will be settled from the point of view of animal protection and humanity. The electro-technique is easy, handy and simple, and admits of the construction.

of apparatus without danger to man. The obligatory use of this method of stunning animals has nothing objectionable in it.

Baxa, Dr.—Sexual Abuse of a Calf.—*Berliner Tierarzt Woch.*, Sept. 7th, 1928.

ON March 11th of this year I was called to a near-by village to look at a calf which, according to the owner, was quite well the previous evening, the shed had been broken open in the night and the calf showed symptoms of illness from which the owner concluded it had been badly abused. The maid at two o'clock in the morning had seen two drunken fellows who knocked at her bedroom window and desired admittance, and after being refused, went away noisily. A connection was noted between these incidents. The first examination of the calf was made by me at 10 o'clock in the morning. The inspection showed a three-months-old well-developed female calf, pale grey, 90 cm. in height at the shoulder. The lively but troubled calf stood looking round at itself with arched back and tail stretched out straight from the body. The vulva is very severely swollen to about three times its normal size, and much inflamed. Distally from the ventral commissure of the vulva there is stasis oedema as large as a small apple. The mucosa of the vagina from the lips to as far in as could be seen shows extensive changes which are similar dorsally, ventrally, and laterally. It is very glistening, inflamed and swollen, its epithelium coloured mostly a dirty grey, and partly raised from its bed. On the first view of the vestibule of the vagina a few drops of a clear slightly bloody fluid escaped. No tears or wounds of the mucosa are present. The animal shows considerable pain on passing dung and urine. Appetite poor, but not lost. Digital examination per rectum only causes slight pain.

After this examination the diagnosis was "Inflammation of the external genitals and vagina brought about by the forcible effect of a blunt foreign body from without." Probably the evil-doer had made an effort to have thorough coition with the animal, which, from its size and the anatomical relations of the genital organs, was not impossible. Strict proof could not be got, as the clear, slightly bloody fluid, which could have been examined for human semen, flowed away on opening the vulva.

Prognosis is doubtful, as there may be a rent high up in the vagina. On this account antiseptic injections and Merck's carbon pencils were used. The calf gradually got better and had quite recovered by April 9th. The owner noticed on March 12th that the ears of the calf swelled greatly at the base, seeming to indicate that it had been

held by the ears whilst the evil deed was done. The vulva of the calf remained larger than before.

The gendarmes arrested two fellows on suspicion. One proved an alibi. The second was detained nine days for examination. He lied obstinately and for want of exact proof was finally liberated.

Reviews

How to Stain the Nervous System. A Laboratory Handbook for Students and Technicians. By J. ANDERSON, head laboratory assistant at the National Hospital (Queen's Square), for diseases of the nervous system. With an Introduction by J. G. GREENFIELD, B.Sc., M.D., F.R.C.P., Pathologist to the National Hospital, Edinburgh: E. & C. Livingstone, 1929. Price 5s.

AN interesting book of 137 pages, the subject being divided up into six chapters, an appendix and an index.

The book throughout its pages gives evidence of the skilled technician.

Chapter 1, in which the author deals with the removal, cutting and fixing of the brain and spinal cord, is very instructive and will be of great use to anatomical workers, as well as to pure laboratory workers.

His machine, which is illustrated, for slicing the brain, is especially interesting.

The methods of preparing Celloidin, paraffin and frozen sections are lucidly explained, and one notes that such essential details as microtomes and the attendant difficulties in connection with the knife are not neglected.

His views on stropping and honing are very instructive to one who has had experience of this bugbear, gall section cutting.

Many methods of staining are discussed, and the author's modifications given. His most important modification being the use of heat, in order to shorten staining time and give a better selective action.

Mr. Anderson has found calcium hypochlorite of value as an oxidising agent in the ripening of stains, and also in mordanting he favours chrome salts.

Pages 95-96 will be read with pleasure by all who have seen their work slip off the slide and go down the drain.

Chapter 5 deals in detail with some special methods for staining fat iron and calcium, as used by Dr. E. Weston Hurst at the National Hospital.

Pages 122, 123 and 124 contain some interesting details respecting the making of lantern slides.

The Appendix is devoted to the various formulæ used in histological work, and its twelve pages are full of details of great interest to student and expert.—J. McC.

Helminthology—Medical and Veterinary. By H. A. BAYLISS. Pp. xi + 303. Size, $9\frac{1}{2} \times 6\frac{1}{2}$ inches. Figs. in text (200). London: Baillière, Tindall & Cox. Price 30s. net.

IN the preface to this work the author points out that the study of parasitic worms is a necessary part of the training of the veterinarian.

and of the medical man who intends to practise in the tropics. The literature on the subject has grown enormously in recent years, but the available descriptions of many of the newly recognised species have been scattered through a vast amount of periodical literature, much of which is not readily accessible. The object of the author has been to collect this material under one cover and so assist the work of the student and practitioner by providing a textbook and book of reference. An attempt has been made to provide such short descriptions of genera and species as it is hoped, with the aid of the illustrations, may be found helpful in obtaining an approximate determination of most of the parasites with which one is likely to meet. The attempt has been highly successful and the work of the student of helminthology and of the busy laboratory worker who has much routine work to do is much simplified. The clinical aspect of helminthology is not dealt with.

One of the bugbears of students and clinicians for many years has been the constant changes in nomenclature. This difficulty is likely to be almost at an end, and in this work the author has adopted the names for parasites in accordance with a reasonable interpretation of the rules of the International Commission on Zoological Nomenclature. Owing to the international character of these rules the difficulties are less likely to occur in future, but there arises another difficulty for the busy clinician who may and frequently is unable to recognise an old and familiar friend in a new name. Many synonyms have been given and no doubt it is quite impossible to give anything like a complete list. For example, the veterinarian will look in vain for his old friends *Tænia marginata*, *Strongylus gracilis*, and *Strongylus armatus*. He will find, however, that his old friend *Strongylus tetracanthus* having passed through *Cylicostomum* (or *Cylicnostomum*) *tetracanthum* has now become *Trichonema* (or *Cylicostomum*) *ægyptiacum*, while *Trichonema arcuata* has disappeared.

The discovery of new genera is often liable to be disconcerting to the clinician. Over 30 species of the genus *Trichonema* have been described from the large intestine of members of the horse tribe, and it is a matter requiring considerable skill to separate many of them. "Since pure infections with a single species are practically unknown, and all presumably have similar habits and, when present in large numbers, similar pathological effects, the attempt to determine the forms present in any given infection is perhaps of somewhat academic interest." And so the clinician may indulge in a sigh of relief.

In addition to a very comprehensive general index there is also a most useful index to parasites of man and the principal domestic animals arranged under their hosts.

We welcome this work as a great boon to all students of helminthology. The descriptive text is most lucid and the figures wonderfully clear and demonstrative, and the whole make-up is quite up to the usual excellent standard of the house of Baillière, Tindall & Cox.—G.H.W.

Dogs. An illustrated handbook by LADY KITTY RITSON (Lady Kitty Vincent). Pp. 177. Chatto & Windus. Price 5s. nett.

EVERY veterinary student, and indeed every veterinary surgeon, ought to possess Lady Kitty Ritson's interesting little handbook on the Dog. It is written in the usual racy style by which this authoress knows so well how to fascinate the interest of her readers, and from start to finish

there is not an uninteresting paragraph. Every chapter is inspired by a writer who quite obviously knows the subject from A to Z, and the hints which are given are not only of practical service to the amateur breeder, but are equally of value to the veterinarian whose daily occupation keeps him amongst a canine clientèle.

There are 12 chapters, and these include amongst their headings "The Choice of a Breed," "The Rearing of the Puppy," and later on all about its weaning and the use of foster mothers. There are hints on training, hints on health, valuable advice about showing dogs, and a whole chapter is devoted to the subject of "Kennels and Their Expenses."

To commence to try and take paragraphs out of any of these chapters would be useless in a review such as this, because of the limited space which editors of scientific journals naturally allot for books of a lay character. The best thing that we can do for our readers is to advise them to get the book for themselves, and we are quite sure that once it is obtained it will be one of those which always lie handy for perusal on the waiting room table.

"In My Opinion"—Dissertations on Horses and Horsemanship by Various Authors. Edited by MAJOR W. E. LYON. Constable & Co. Pp. 308, fully illustrated. Price 31s. 6d. net.

MAJOR LYON is to be congratulated on bringing together in book form the methods adopted by present-day experts in the different aspects of horsemanship. Though the harness horse and pony are not considered, the scope of the book is large. The six parts, each division of which is contributed by an authority on this subject, cover The Evolution of the Horse, the Racehorse, the Hunter, the Hack and the Pony, with a final section on miscellaneous subjects; several of veterinary interest. The space allocated to each subject is of necessity limited, so that general principles only are outlined. This is as regrettable as it is inevitable, and the authors who have dealt with subjects such as the training of racehorses or hunters are to be admired for the masterly handling of their subject in so few pages. The article on the horse in portraiture is a pleasant and unusual inclusion. Of equal interest is the section devoted to the art of the "Haute Ecole" in Vienna. The illustrations, themselves contributed by experts amongst whom are A. J. Munnings and Lionel Edwards, are a notable asset to the work. Major Lyon has been eminently successful in editing a work invaluable alike to the amateur and expert, and with an instant appeal to the veterinarian; and those whose work or interest lies with horses should certainly find it a place on their bookshelves.

International Directory of Pedigree Stock Breeders. Price 25/- nett.

THE Vernon Press, under the editorship of Mr. R. de Toll, have compiled in the "International Directory of Pedigree Stock Breeders" a mass of information which is of the greatest service to anyone who is interested in the breeding and exportation of stock to any part of the world.

In a volume of some 820 pages, fully illustrated on art paper, one can find at a glance the names and addresses of the principal pedigree stock breeders and owners in every part of the world. To a veterinary surgeon in a breeding district it is an invaluable asset, and its influence extends from the different horse-breeding stables of civilised Europe to livestock

breeding in Samoa, Torres Straits Islands and every little civilised community from one end of the world to the other.

Green's Manual of Pathology and Morbid Anatomy. Revised by A. PINEY. 14th edition, pp. viii+650, 8 coloured plates, 261 text figs. London: Baillière, Tindall & Cox, 1928. Price, 21/- net.

THOUGH written for medical students of pathology, Dr. Green's book has been studied by many generations of veterinary students, who, on the appearance of the 14th edition, will pay tribute to the genius of its founder. Of this achievement the Editor of the *Jour. Path. and Bact.* has written (1928, 31, 439) a characteristically brief but very informative biographical sketch, which merits reproduction in this notice: "Thomas Henry Green (1842-1923) first produced 'An Introduction to Pathology and Morbid Anatomy' in 1871—a modest duodecimo of 304 pages and 60 elementary woodcuts, of rather a devotional appearance with a sober binding and a title page in red and black; published by Henry Renshaw at 8s. 6d. It was evidently a popular book for the sixth edition—the last to be revised by the author—came out in 1884, grown to 556 pages with 150 figures, and it was translated into Japanese in 1876 and 1886. Subsequent editions, from the seventh in 1889, have appeared under the guidance of Green's colleagues and successors in the medical school of Charing Cross Hospital—S. Boyd, H. M. Murray, W. C. Bosanquet, W. W. C. Topley, G. S. Wilson—and now revised by Dr. Piney, the book reaches its fourteenth version, a respectable seniority equalled among text-books of pathology in English only by Delafield and Prudden." A copy of the fourth edition (1878), presented to the library of the Royal Veterinary College by Professor J. B. Simonds, enables us to recognise a considerable part of its text and several of its illustrations in the volume published 50 years later.

The discussion on "tumours" in the fourteenth edition, which fails to emphasise the difference between hyperplasia, metaplasia, and neoplasia, compares unfavourably with Green's 1878 introduction to the subject. Students, taught in the wards to regard "tumours" as "lumps," turn up their fourteenth edition to read "in pathology the term 'tumour' denotes certain local growths of new tissue, which appear to be excrescences upon the general plan of the organism." We confess to expecting better things of pathology than such a sentence. Since Dr. Piney, in his brief mention of Gye's theory, introduces the term "neoplasia," we fail to understand why, if only in the interest of the student initiate, "neoplasm" should not replace "tumour"; the mistake of regarding hyper- and meta-plastic synovial villi as papillomata (simple epithelial neoplasms) would not occur.

From the merely incidental references to rheumatic disease no student reader could be blamed for failing to recognise the importance of one of the principal causes of disability in Great Britain. The description of arthritis is weak, and the statement on page 419 that in acute infective arthritis "the whole cavity of the joint becomes lined with a layer of granulation tissue" requires considerable amendment. Again, on page 420, the definition of osteoarthritis as "a chronic degenerative process occurring in elderly persons" is inadequate, and leads us to express the hope that the fifteenth edition will reflect the results of the large amount of post-war

study on arthritis. We respectfully call the attention of the reviser to the proceedings of the Conference of Rheumatic Diseases, Bath, 1928.

Compared with some of the drawings of organs the majority of the illustrations are of inferior quality. Figure 93 would more readily convey its lesson upon macroscopic agglutination if each tube was labelled, while Figure 94, illustrating the phenomena of complement fixation requires a colour plate. The drawing of a "mixed tumour" of the parotid gland, and two very good coloured plates of cystic disease of bone, are unaccompanied by any references in the text.

Dr. Piney has made the chapter (27) upon "the diseases affecting the composition of the blood" one of the outstanding features of his revision. His coloured plates of the white cells more nearly approximate to the stained blood films as seen by students in their practical classes than the blatantly painted cells illustrating the majority of text-books. Possibly Dr. Piney might have assisted his students by inserting (in brackets) the long accepted nomenclature for the leukæmias, e.g. (myelogenous) against his myelæmia, and (lymphatic) against his lymphæmia.

Though a large part of our notice is occupied by criticism, and the revision by a single author of a work covering so vast a field is liable to have its weaker patches, we recognise in the fourteenth edition a text-book which to present-day veterinary students should prove acceptable as was Green's "modest duodecimo" to their fathers. The strong binding, clear printing and very reasonable price, are further recommendations to one of the best student's text-books of pathology in the English language.

Geheilte Knochenbrüche bei Wildlebende und in Gefangenschaft Gehaltenen Tieren (Healed Bone Fractures in Wild and Captive Animals). By E. KORSCHULT, Doctor of Medicine and Philosophy, and HERMANN STOCK, Doctor of Philosophy. Berlin: W. Borntraeger Bros., 1928. Pp. 163, 185 figs. in the text. Price: paper backs, 24 marks; bound, 26.50 marks.

THIS is a very interesting book dealing with the natural healing of fractures in mammals, birds, reptiles, and amphibia. It is beautifully and copiously illustrated. A wild animal goes into a secluded place and rests as much as it can until it can place weight on the injured limb and only hobbles about in order to satisfy its need for food. The facts that it has to secure nourishment, and that when maimed it is in greater danger from its natural enemies induces it to get about as soon as ever it can, and leaves no room for malingering and excessive periods of convalescence. The illustrations show that many fractures unite without the ends of the bone being displaced; others heal by bony union, although the broken surfaces over-ride. Some breaks form pseudarthroses (false joints) and others synostoses. The wide field of observation which the authors have had access to has enabled them to produce a really remarkable book which will be valuable, not only to veterinarians but naturalists, wild animal keepers, anatomists and physiologists.

News

Future of the Veterinary School of Melbourne University.

It has been recommended that teaching for the veterinary degree course should be continued in Melbourne up to the end of the third

year, and that students should then go to Sydney for the fourth year. Also that the University should continue to conduct laboratory, diagnostic and reporting work, together with investigations of outbreaks of disease in animals, for the stock branch of the Department of Agriculture, with University officers, staff, and equipment as at present. The milk laboratory should also continue on present lines. The committee also proposed that a new Act be obtained providing for the above measures, and including provision for ten retainers of £1,500 per annum to veterinary practitioners located in country districts of Victoria.

Number of Veterinary Students in France.

THE number of students admitted to French veterinary schools during 1928 was as follows :—

Veterinary School at Alfort	..	49
Veterinary School at Lyon	..	34
Veterinary School at Toulouse	..	39

Personal

MR. HENRY J. DAWES, of West Bromwich, was made the recipient of a gold cigarette case and a very handsome rose bowl, the gifts of the members of the Midland Branch of the National Veterinary Association, on the occasion of his re-election for the 38th consecutive year as secretary ; a token of esteem and appreciation for faithful service. The prosperity of the Midland Association owes much to the energy of Mr. Dawes, both as regards number of members and prosperity in the other essential points of its affairs ; and the gifts which have been so recently presented to him are a fitting acknowledgement.

MR. CLEMENT ELPHICK, M.R.C.V.S., Veterinary Officer for Northumberland County, has just been appointed Official Veterinary Inspector for the Counties of Cumberland and Northumberland under the Hunters' Improvement and National Light Horse Breeding Society.

MR. N. R. REID, B.V.Sc. (S. Africa), M.R.C.V.S., has been appointed Veterinary Officer to Tanganyika Territory.

Publishers' Notices

All communications should be addressed to 7 & 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone: Gerrard 4646. Telegrams: "Baillière, Rand, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

Copy of advertisements should be in the hands of the publishers—Baillière, Tindall and Cox—not later than the 25th of the month, or if proof is required, not later than 23rd.

Binding Cases for Volume 84 and any other previous volumes can be obtained from the publishers. Price 2s. 9d. post free.

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THE VETERINARY JOURNAL

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APRIL, 1929.

Editorials

THE WHOLE TIME VETERINARY OFFICIAL.

WE make no excuse for drawing the attention of our readers, especially students and young graduates, who intend to make Official Inspection work their future, to an instructive and interesting article on pages 155 *et seq.*, on "Hints for Veterinary Inspectors," by Mr. W. Jackson Young, F.R.C.V.S., D.V.S.M., whose long experience and high position at the Ministry of Agriculture makes him especially qualified to give advice in this direction.

Upon reading the hints given one cannot help but be struck with the facts that tact in dealing with owners and thoroughness in the application of details form two of the most essential qualifications in the character of an aspirant to successful and permanent employment by the Ministry of Agriculture and Fisheries. Not only, too, must he know the Clauses dealing with the Contagious Diseases of Animals' Act but he must be very particular (and yet to some extent broad-minded) in their interpretation.

The hints given in the article alluded to show full well that the author is not merely an armchair official but that he has had great experience in Veterinary Sanitary Science and Police work under the conditions in which it has actually to be applied in the field.

Practical articles of this kind are of especial value, as stated above, to our younger graduates, and to senior students who are framing out the course they desire to follow after qualifying.

HUMANITY TO ANIMALS AND THE HELP NEEDED FROM THE VETERINARY PROFESSION.

THE discussion, instigated by the Royal Society for the Prevention of Cruelty to Animals, on the Veterinary treatment of animals of the poor, which is taking place at the present time before each branch of the National Veterinary Association, is open evidence of the wish of the veterinary profession to assist in the carrying out of acts of humanity to animals; and the need for skilled veterinary help in cases of this kind is shown by articles which appear in this month's issue of the *VETERINARY JOURNAL* by Mrs. Lamb, M.R.C.V.S., a lady graduate who is practising in a very poor district of Ireland, and Mr. R. V. Isherwood, B.A. (Oxon), a senior student in the Royal Veterinary College, who has recently visited Morocco. In each article the great need for skilled veterinary advice and help is strongly emphasised, and it appears to be almost as great in the one country as the other, although perhaps in a slightly different way; and the philanthropic "Richard Martin Society" is much to be commended for the good work which is being done under its auspices for sick animals of the poor—and especially in that it has recognised that the veterinary diagnosis and treatment parts of the work can only be carried out efficiently by a veterinary surgeon. Although both the Irish Free State and Morocco are out of the jurisdiction of the English laws regarding cruelty no countries are beyond the pale when the question of humanity to animals is concerned—and it behoves us as a profession to recognise the fact that we, of all others, should take a leading part on every necessary occasion, in all questions connected with cruelty which is inflicted upon animals, whether intentionally or merely from careless want of thought.

We draw, too, the attention of our readers to an article by Professor Max Müller, the Chief Veterinary Inspector of the Munich Abattoir, on the application of Electricity for rendering cattle and other food animals unconscious before any actual cutting is done. The method has been carefully reasoned out and practically applied by Professor Müller and Herr Weinberg, an Engineer, and is now on a more extended trial at other abattoirs in Germany. It is an instance of the value of collaboration, the veterinarian taking his share of the work and the engineer his part—working together for the furtherance of humanity towards animals.

General Articles

NOTES ON THE EARLY HISTORY OF THE VETERINARY SURGEON IN ENGLAND.*

By FRED BULLOCK, LL.D.,

Registrar of the Royal College of Veterinary Surgeons.

THE field of veterinary history has been so thoroughly garnered by Major-General Sir Frederick Smith as to make it difficult to do more than glean here and there. It was my privilege to be associated to some slight extent with his "Early History of Veterinary Literature and its British Development," and that experience gave me—who am neither veterinary surgeon nor historian—an interest in the subject. In the following pages I have constantly referred to Sir Frederick Smith's work.

When the Latin author Columella wrote his "De Re Rustica" about the time of the second invasion of Britain, he described the medicine of animals under the new term "medicina veterinaria," but makes no mention of the shoeing of horses. By A.D. 110, however, the Roman Army had a *veterinarium*, with a forge attached to it. Its place in the camp is described by Hyginus Gromaticus (*Liber de Munitionibus Castrorum*, 21, §22). It was a hospital for sick and wounded horses and other animals. If, however, before the Romans left Britain in A.D. 400, "medicina veterinaria" was practised in this country, no evidence of it remains; nor did the "veterinarius" or veterinary surgeon, if he existed here in Roman days, answer to that name again for 1400 years.

The Ancient Laws of Wales show that in the tenth century such equine diseases as staggers, strangles, farcy, worms and restiveness, such cattle diseases as scabies, rot and redwater were known. The horse is to be warranted against the staggers for three dew-falls, against the black-strangles for three moons, and against the farcy for one year. In the case of mange the purchaser must swear that he put the animal on a clean pasture and in a stable in which there had not been mangy animals for seven years. One need not suggest that it was a veterinary surgeon who would be called in to give his certificate of soundness in the tenth century, but when the claim under the warranty was made some expert person would doubtless be consulted to settle whether the disease was the one warranted against. It was

* A paper read (January 2nd, 1929) before the Royal Society of Medicine (History of Medicine Section). Published by permission of the Editor of the Proceedings of the Royal Society of Medicine.

also specified in the Laws that payment must be made to one who gives a remedy *to a man or to an animal*. This seems to show that human and animal medicine were the work of the same leech.

In the Anglo-Saxon Leechdoms, which contain a number of veterinary references, there is no separation of them from the general body of medical matter.

After the conquest all is dark for a while, but the growth of chivalry with the Crusades must certainly have given a great impetus to equine medicine and surgery. The chevalier or knight was the fully-equipped feudal tenant on horseback. He made it his pride that he could shoe his horse and treat it in disease. It is in this period of the heyday of chivalry (1200 to 1500) that the doctor of horses separated off as a specialist from the general practitioner, much as the surgeon and dentist separated off. We now meet with a new term to describe the doctor of horses, namely, *Marshal*, his profession being that of *Marshalsy*. All the great houses of the nobles would certainly have their marshals and smiths as part of their domestic establishment.

The origin of this word is Teutonic, Old High German *Marah-skalh*, the "horse-groom," which became in Italian *mariscalco*, *maliscalco*, and *maniscalco*, and in Old French *mareschal*, from which we get the English *marshal*. This word ousted the Latin *veterinarius* for several centuries. Doubtless it came into use during the German invasion, grew into importance during the Crusades, and secured a new vogue under the influence of Jordanus Ruffus, the Master Marshal of Frederick II, the *Stupor Mundi*. This great German Emperor, King of Sicily from 1216 to 1250, a student of zoology and of medicine, the most accomplished sovereign of the Middle Ages, was keenly interested in veterinary medicine, and encouraged his master marshal to produce a work on this subject. So Ruffus, himself styled *imperialis marescallus major*, wrote, with Frederick's help, a treatise commencing "Izi cominza lu libru di manischalchia compostu do lu maestro Giordano Ruffo . . . mariscalco del imperatore Federicu." This work had an immense vogue. It was copied and translated into many languages, and we possess in the British Museum at least three different mediæval manuscript copies, viz. Harl. 1637, 3535, and 3772. The *veterinarij* of Rome now became *mariscalci*, and *ars veterinaria* became *marescalcia*.

Very soon we meet with "marshals" in England. The earliest reference seems to be in Wace's *Chronicle*, 1330, but the master marshals there referred to appear to be no more than horse-grooms. In 1356, however, the master marshals of London obtained an ordinance from the Mayor and Aldermen, giving them authority to rule the craft. Riley, in his translation of this Ordinance, writes "Master Farriers"

for "*les bons genes mestres mareschals*," but as the word "marshals" was already in full use, it seems proper to retain it here. The Ordinance itself shows, too, that there was already a distinction between the craft of shoeing, and the "*mestier*" of "*marchalcye des chivaux*."

It is interesting to note in passing that the good folks of the trade agreed with the Masters "that they will well and loyally advise all those who shall ask counsel of them as well in the purchase of horses as in their cure . . . and that no one of the said trade shall commence or undertake any great cure if he does not reasonably see at the beginning that the same cure will be brought to a good end; and that if any person shall undertake any great cure and shall fear in his conscience that the same will take a disastrous turn, then in such case he shall come before the masters and other wise men of the said trade to ask their counsel and aid for the saving of the horse and for the profit of him to whom the horse belongs and the honour of the said trade." . . . "And if the contrary be found or it shall be proved against any person that through negligence he has let such horse perish, then he shall be accused thereof before the Mayor and Aldermen and be punished at their discretion in the way of making restitution for such horse to the person to whom the same belongs."

The rule as to consultations in difficult cases was similar to that found in the contemporary Surgeons' Gild, but the surgeons did not have to make restitution for the patients they lost! Those who took up animal surgery found this great obstacle always before them, and to-day the progress of veterinary medicine is handicapped by the fact that the surgeon is, as a rule, not allowed to treat a case unless it is economically worth treating. On the other hand, there have been those who have been thankful that their patients had no soul to be saved, saying, "For if they had, the Lord have mercy on us all!"

Shortly after the Marshals' Ordinance of 1356, we find a case in the Year Books where a marshal was sued for negligence in treating a horse, by reason of which the horse died.¹ Again, in 1441, we find the record of a writ against R. Mareshall for that he "*assuma sur lui a Londres a curer un cheval d'un certain maladie et qu'il adeo negligenter et improvide imposuit medicinas suas, etc., quod equum, etc., interfecit.*"²

In an earlier case, brought in 1374, against a surgeon with the ominous name of J. Mort, who had, it was alleged, negligently treated an injured hand, it was argued, "If I deliver my horse to a farrier to shoe, and if he pricks my horse, I shall have a writ of trespass against him, or if my horse is wounded by being pricked with a nail, and I deliver him to a marshal to cure, and by his negligent treatment my horse is maimed, I shall have a writ on the matter."

It is clear, therefore, that at this date, 1374, there is a distinction between the farrier or smith who shoes the horse and the marshal who treats the horse for injuries.

The name *Marshal* for the doctor of horses, and *marshalcye* for his profession, persisted certainly until the eighteenth century. The *New English Dictionary* gives examples from 1389 and 1430, and one from 1506 in the Lord Treasurer's Accounts, Scotland, shows its use as a verb: "Item, to deif Andro, that marshalit foure horse to the King."

That the marshals were of considerable importance in the life of the City is evident from the precept issued by the Mayor and Aldermen of London in 1431, directing the sheriffs that they must not summon any "*marescallos equorum*" to serve on juries, except in cases of urgent necessity.

At this period, the fifteenth century, there were in circulation a number of treatises on Marshalsy. In Mrs. Singer's list of Medical MSS. there are several in Latin, French and English. The following titles in English are the most interesting for our present purpose:—

British Museum. Harl. 6398, the Boke of Marchalsi.

Cambridge (219) Dd. iv. 44, "This is the marchalcie of Piers Moritz."

Oxford, Ball. Coll. Cod. 354 (vii) "The Book of merchalcie or Treatise on the breaking and managing of horses with medicines and modes of treating them in illness."

Oxford, 8608 (1697 cat.) "The book of merchalsy for curing horses of maladies."

Harl. 6398 is a copy of the same work as Harl. 5086, and these appear to be the earliest English MSS. in which the word "*marshalsy*" occurs. The work itself is analysed by General Smith in Vol. I of his *History* and judged to be of poor quality, not comparable to that of Jordanus Ruffus.

FitzHerbert, who wrote a celebrated *Boke of Husbandrie* (circa 1523), described the veterinary practitioner of his day as "horse-leech," "he that taketh upon him to cure and mend all manner of diseases and soraunces that horses have," but he does not seem to have had a very good opinion of him, or for that matter of the contemporary apothecary. He himself writes well on the diseases of horses, cattle and sheep, and was the first to ascribe liver fluke to the presence of snails in the pastures.

Henry VIII, during whose reign several Acts were passed prohibiting the export of horses, and providing for the better breeding of horses, brought into the country, in order to take charge of the Royal Studs, the famous Italian master marshal Hannibal, spoken of for centuries after as a great horse leech. As serjeant farrier he

would have on occasion to assist the serjeant surgeon at the gruesome State punishment by mutilation as provided for by Act 33 Henry VIII, c. 12 (1541).

Under Elizabeth we know that Martin Hollyman or Alman served as serjeant farrier, being in charge of the studs at St. Albans, and Richard Snape as yeoman farrier.³ In this reign Thomas Blundeville published his *Fower chiefest Offices of Horsemanshippe* (1565), but does not speak of marshals, describing the practitioner as "Keper and Ferrer." Neither does he use the word "veterinary" though the work of Vegetius, *De arte veterinariæ sive mulomedicinæ*, had been published at Basel in 1528. Blundeville made use of some of the old English treatises in MS. to which we have referred and borrowed a good deal of information from the aforesaid Martin Alman, whom he describes as "Chief Ferrer to the Queen's Majesty," and "the most skilful ferrer that I know in all England." That "ferrer" was used by Blundeville to mean a general practitioner in veterinary medicine is clear from the account of diseases which the ferrer is expected to treat, and from the fact that he still makes a distinction between the smith who shod horses and the ferrer who treats them for diseases and injuries. But Martin Alman is described in the Accounts of the Progresses and Public Processions of Elizabeth (1559-1569) as "Marshall Ferrer," an account of his for "curing and dressing the Queen's horses" being listed. T. Clifford in his *Schoole for Horsemanshippe* (1585), speaks of that "famous Marshal Martine Alman," and the Duke of Newcastle in his great work of horsemanship (1667), calls him "Prime Marshal to Queen Elizabeth, an excellent Farrier." In the Accounts of the Reign of Charles I⁴ is a bill of one of His Majesty's farriers, for "marshalling His Majesty's Hunting Horses for the year 1626," but by now the title "Farrier" was ousting that of "Marshal."

Our military annals show that in 1591 the "skilful Ferrar" who could judge of lameness and soundness was needed by the Muster Masters who conscripted for the army.⁵ In the famous law case of *Powtuary v. Walton* (1597) it was laid down that "si un farrier assume sur lui a curer mon cheval que est gravelled en ses pieds, & puis ita negligenter et improvide heald le dit cheval que ceo morust" there will be an action for negligence. Nevertheless, the "Marshal" does not quite disappear for another century.⁶ In 1678 Sir W. Hope published his *Parfait Mareshal or compleat Farrier*, and in 1639 Thomas De Grey in his *Complete Horseman* speaks of the "skilful ferrier or marshal" as being one most expert in horseleech craft, as distinguished from the "empyreticall horse leach." Even as late as 1720 Gibson in his *Farrier's Guide* still speaks of marshals. Only once in this period do we meet with the term "Veterinarian," and that is when Sir

Thomas Browne compares "common farriers" with "good veterinarians" (*Pseudodoxia Epidemica*, 1646).

It is clear that the veterinary surgeon of this period was both shoeing-smith and surgeon. Hexam (1637) describes the duties of the army farrier as "to drench and lett bloude the horse of the troupe, and alwaies, either upon a march or in quarter, to have in readiness his buggett of tools, horse shoes and nailes, whensoever he shall be called upon by his officers, or when any gentleman of the troupe shall have use of him, and for this reason that he must duly attend upon the Troupe he is freed from other duties and hath a greater paye than an ordinary horseman."⁷

In 1674 the Master, Wardens and Fellowship of the Craft and Mystery of Farriers of London secured a charter from Charles II on the ground that their "Art and trade is of great antiquity and of great use and benefit to our subjects for preserving horses, and that divers inexpert and unskilful persons . . . have taken upon them to practise and have destroyed many horses" . . . The Charter established the Company of Farriers of London, with rules similar to those for barber surgeons. Power was given to the company, under certain safeguards, to visit shops, cellars and stables and to search for any defective works, medicines and ingredients used, and to take action against offenders. Andrew Snape (senior), serjeant farrier to Charles II, was in 1675 Master of the Company. He is also described in the State Papers as "Marshal Ferrier." His son Andrew, also a member of the Farriers' Company, who claimed that his family had occupied the position of farrier to the King for 200 years, was the author of an elaborate *Anatomy of an Horse* (1683), the first work of its kind in English.

During the eighteenth century we find farriers treating horses, and cowleeches and cattle doctors treating cattle, sheep and pigs. They all, no doubt, were "hereditary" doctors, with recipes handed down from father to son, and they probably also made use of the wretched books published by Gervase Markham and his imitators. But in this century a number of medical men and others gave some study to the subject, and wrote books mainly on the diseases of horses, though the cattle plague of 1714 and 1745 brought out a few writers on diseases of cattle, e.g., T. Bates, F.R.S., 1717, Cromwell Mortimer, M.D., 1745, Richard Brocklesbury, M.D., 1746, E. Litton, 1750, D. P. Layard, F.R.S., 1757. The most important work was probably Sir William Hope's translation of Solleysel's *Parfait Mareschal* at the beginning of the century, in which, by the way, Hope described himself as a lover of marshalry and horsemanship.

Those who wrote on the diseases of horses usually spoke of the

subject as farriery, their books being entitled as a rule "The Gentleman's Farriery." Among these we may note John Wood, who though he claimed "a natural genius for farriery," was not a member of the Farriers' Company, and was very ignorant of the subject. He is noteworthy, however, for having in 1758 published a proposal to establish a hospital for horses for the public benefit. Among the subscribers to his book I find, in addition to the names of five London farriers, the name of Sergeant Surgeon Ranby. Wood's proposal does not appear to have matured. The Farriers' Company was, however, like the College of Physicians at this time, more interested in keeping their circle closed and the entrance narrow, than in enlarging it, allowing the introduction of new men with new ideas. This is shown by their treatment of Wm. Osmer, a surgeon who, with his brother, "undertook the cure of horses in the various complaints, and having them shod in the proper manner." He declares in his "Treatise on the Diseases and Lameness of Horses" (1759) that his intention is to extricate the science of farriery from the hands of the ignorant and illiterate. Having issued some chapters of his book dealing with the foot and shoeing, to show the utility of his work, he says it was "tried and condemned in an august assembly as a matter of no use or benefit." Sir F. Smith⁸ suggests that the august assembly was the Jockey Club. Since that volume was written I have discovered in the archives of the Farriers' Company evidence which shows that Osmer was also "tried and condemned" by the Worshipful Company of Farriers. Though Osmer was, as General Smith says, probably superior to all his predecessors in his knowledge of the cause of lameness in horses, the fact that he dared to open a forge and to shoe horses as well as to treat them for diseases caused the Court of the Company to resolve on November 10th, 1766, to prosecute him for carrying on business as a farrier in Oxford Street, not being free of the Company. They sold out £25 of their South Sea Stock to meet the costs of the suit, but on April 2nd, 1767, the Master reported to the Company that they had been non-suited for want of sufficient evidence.

It is rather a humorous situation—Osmer on his side declaring that the farriers are illiterate, hidebound, prejudiced, in favour of their antiquated methods, cruel in many of their remedies, and offering them a better way; on the other side the Company, seeing their craft in danger, appealing to the Court, only to be treated like Demetrius the silversmith, at the hands of the town clerk of Ephesus, though with not quite so much celerity.

The attitude of the Company to Osmer was but in keeping with a decision which had been taken as early as 1762, when they received

a request from several noblemen "and gentlemen of the First Distinction" who had "suffered by the ignorance of unskilful quacks who assume to themselves the name of Farriers" to take action against all "foreign" farriers. Those who, after warning, did not join the Company were compelled to shut up shop. But unfortunately there was no attempt on the part of the Company to institute a better system of education and training for their members, and they were apparently averse to any such move. Edward Snape, who was a member of the Company and farrier to George III, proposed, however, in 1765 to establish in London a Hippiatric Infirmary "for the instruction of pupils in the Profession," but he received no encouragement from the Company. When, in 1778, he did establish his infirmary, it was not a success.

During the latter part of the eighteenth century there appears to have been a considerable demand for veterinary knowledge, for the works of the writers of "Gentlemen's Jockeys" and "Pocket Farriers" ran into edition after edition. William Taplin, a surgeon, sailed on this tide into a fortune by selling medicine for horses by agencies all over the kingdom and advertising them by means of his books. The calls on the services of the few men who were capable of treating horses' diseases must have been very heavy. The poor horse suffered both from bad roads and bad shoeing, and once the feet were done the horse was done.

But a new era was at hand. When the attempts of Wood and Snape to establish a veterinary school fell through, the Odiham Agricultural Society in 1785 began to discuss "what were the most likely means to encourage the study of scientific farriery." In 1788 and 1789 they published an appeal in which, lamenting "that there is not yet in England any establishment adequate to the desired improvement in farriery by a regular education in that science on medical and anatomical principles," they expressed their intention, if sufficient funds were raised, to send two or more students to be trained at the Alfort School near Paris. In 1789, however, Charles Vial de Sainbel came to England and issued proposals for reading lectures on the general knowledge of the horse, and in the following year he published a "Plan for Establishing an Institution to Cultivate Veterinary Medicine."

It was this plan which ultimately displaced the project of the Odiham Society. It is well to notice that the Odiham Society speaks of "Farriery," Sainbel speaks of "Veterinary Medicine." A general meeting of subscribers to the proposed Veterinary College was held in April, 1791, when officers were elected and regulations made for the constitution and organisation of the college. The Odiham Society,

on hearing of the actual establishment of the college, very magnanimously decided to drop their project ; they sent on all their papers to the new college, and directed the subscribers to their fund to transfer their subscriptions to the new institution.

Among the most active supporters of the college was John Hunter, who was described as " the life and soul of the undertaking." He was a vice-president, and other vice-presidents included Sir Joseph Banks, P.R.S., and Sir George Baker, Bt., F.R.S. The curriculum was to cover a three years' course in anatomy, the exterior of the horse, and external diseases, materia medica, pharmacy, botany, shoeing, pathology, medicine, surgery, epizootic diseases ; and, when the pupils had completed their studies, and had undergone a public examination in the theory and practice of every branch of the veterinary art, they were to receive a certificate if they were considered as perfectly instructed therein.

In the prospectus of the school, issued in 1793, the following paragraphs occur which are believed to be from the pen of John Hunter :

" The incompetency of the persons to whom (the veterinary art) has been abandoned, has drawn contempt upon the art itself, and few have ventured to concern themselves with a profession that seemed incapable of conferring any honour upon those that exercised it . . .

" It requires the sacrifice of as many years to become a skilful veterinarian as to become a skilled physician ; the acquisition of the science and the practice of each is a task sufficient to engage one man's life, and the contrary opinion is a portion of that ancient error which, while medicine was regarded as the province of the learned and the few, supposed the veterinary art on a level with the most ordinary capacities."

The English school, therefore, began under good auspices, but it soon fell on evil days. Sainbel died in 1793, and though John Hunter quickly arranged for the students to attend lectures at his own theatre and those of other eminent teachers in London, the tragic death of Hunter himself speedily followed.

While the London school was limping along under the crippling influence of Coleman another school was founded by William Dick in Edinburgh in 1823. This grew rapidly, and in many respects outstripped the London school. The rivalry of the two schools did not tend to the growth of a united profession, and very soon the veterinary practitioners began to urge the establishment of a single body to govern the profession. Nothing could be done while Coleman was alive, but meetings to this end began in 1841, and in 1844 a Royal Charter was obtained establishing the Royal College of Veterinary

Surgeons, to consist of the graduates of the two existing schools and of any other schools which should be affiliated to the Royal College by Royal Sign Manual. The examinations were to be conducted by the new body, which was to appoint the examiners, control the curriculum, and award the diploma.

A Board of Medical and Veterinary Examiners was appointed, and it may interest this Society to know that the medical examiners included such men as W. T. Brand, Bransby Cooper, Robert Liston, Robert Knox, John Lizars, William Babington, S. Solly, and later Richard Quain, William Sharpey, and Alfred S. Taylor.⁹

Veterinary science was now a speciality. Up to this time I venture the suggestion that in England physicians and surgeons had attended to the injuries and ailments of animals when the occasion arose. All gentlemen were horsemen in those days at any rate, and the educated physician or surgeon would no doubt try his own treatment with his favourite horse, or with his friend's horse, though he might condescend to listen to the advice of the horseleach. The physician would frequently be mystified by the varying response to treatment his animal showed in the case of remedies the effect of which on man he knew well, but it would never have paid him to go very deeply into the matter. He sold his horse and got a fresh one. And so, as Hunter said, "Veterinary science was abandoned," much as surgery had once been abandoned, to anybody who cared to spend his time unprofitably upon it.

The human subject clamoured for treatment, and the demand created the supply. "Skin for skin," said Satan to Jehovah, "Yea all that a man hath will he give for his life," and so the study of human medicine was profitable. But the dumb animal only got attention when the pocket of the owner was threatened, for it was not until last century that kindness to animals and care for their well-being became a duty generally recognised. After the good beginning made by Frederick II in the thirteenth century, it is somewhat shameful that little more was done in Europe towards encouraging veterinary science till the end of the eighteenth century, and that until the beginning of the twentieth century no veterinary school received any financial assistance either from the public or from Government, apart from the one public effort of 1791.—*Proceedings of the Royal Society of Medicine*, March, 1929.

BIBLIOGRAPHY.

BATES, T., "Contagious Disease among Milch Cows," *Phil. Trans.*, 1717-19, xliii. BLUNDEVILLE, T., *Four Chiefest Offices of Horsemanship*, 1565. BROCKLESBURY, R., *Mortality among Horned Cattle*, 1746. CLIFFORD, T., *The Schoole of Horsemanship*, 1585. COCKAYNE, O., *Leechdoms, Wortcunning, etc.*, 1865. DE GREY, T., *The Compleat Horseman*, 1639. FITZHERBERT, J., *Boke of Husbandrie*, c. 1523. GIBSON, W., *Farrier's New Guide*, 1720. HOPE, Sir W.,

The Parfait Mareschal, 1696. HYGINUS GROMATICUS, *Liber de Munitionibus castrorum*, A.D. 110. LAYARD, D. P., *Nature, Cause and Cure of Contagious Distemper among Horned Cattle*, 1757. LITTON, E., *Distemper among Horned Cattle*, 1750. MARKHAM, G., *Maisterpeece* (at least 21 editions), 1610-1723. MASCALL, L., *First Booke of Cattell*, 1587. MORTIMER, C., *Distemper among the Cow Kind*, *Phil. Trans.*, 1745, xliii. NEWCASTLE, Duke of (WILLIAM CAVENDISH), *New Method and Extraordinary Invention to Dress Horses*, 1667. NICHOLS, J., *Progresses and Public Processions of Queen Elizabeth*, 1788. OSMER, W., *Dissertation on Horses*, 1756; *Treatise on Diseases and Lamenesses*, 1759. OWEN, A., *Ancient Laws of Wales*, 1841. RILEY, H. T., *Memorials of London*, 1868. RUFFUS, G., *Libru di Manischalchia*, Manuscript, c. 1520 (B.M. Harl. 3535). SMITH, Sir F., *Early History of Veterinary Literature and its British Development*, 1919, i; 1924, ii; *History of the Royal Army Veterinary Corps*, 1928. SNAPE, A., *Anatomy of an Horse*, 1683. TAPLIN, W., *Gentleman's Stable Directory*, 1778, at least 15 editions. WOOD, I., *Compendious Treatise of Farriery*, 1757, Supplement, 1758. Y. B. = *Year Books*. Reports of Cases in King's Courts, 13th to 16th centuries.

REFERENCES.

- (1) Y. B., 43 Ed. III, f. 33, pl. 38 (1360).
- (2) Y. B., 10 Hen. VI, f. 49, pl. 5.
- (3) Letter from R.S., Lambeth Library, dated July 30th, 1594.
- (4) Hore, *History of Newmarket*, ii, 6.
- (5) Smith, *Hist. R.A.V.C.*, p. 5.
- (6) Gervase Markham left on his death in 1637 an unpublished MS. entitled "Le Marescale or Horse Marshal." Smith, *Early History of Veterinary Literature*, 1919, i, p. 236.
- (7) Smith, *Hist. R.A.V.C.*, p. 6.
- (8) Vol. ii, p. 88.
- (9) Since those days there have been James Syme, Alex. Crum-Brown, W. H. Flower, William Turner, J. Burdon Sanderson, J. G. McKendrick, W. D. Halliburton, Sims Woodhead, and Noel Paton.

HINTS FOR VETERINARY INSPECTORS.

By W. JACKSON YOUNG, F.R.C.V.S., D.V.S.M. (Vict.).

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THE duties of part and whole-time veterinary inspectors in Great Britain are ever increasing, and it is regrettable that more of a helpful nature is not recorded for the benefit of those who hold office or who are about to take up the duties of an appointment for the first time.

The veterinary inspector is an important official and his actions are frequently criticised by those inside and outside of his profession. His services are in much request and he is required to be prepared for duty at all times.

He meets all sorts and conditions of men and animals and has many difficulties to overcome. It would be exceedingly difficult to find a more versatile official as his duties are various, never monotonous, and always accompanied by a large amount of responsibility.

In the following notes, no attempt will be given to furnish a complete catalogue of the necessary equipment that each veterinary inspector should possess, but information will be given concerning matters that the writer has found useful to him in the course of a busy life.

KNOWLEDGE OF PATHOLOGY AND BACTERIOLOGY.—An intimate knowledge of the diseases mentioned in legislation is required. Such can be obtained by careful observation and the study of text-books and numerous technical journals. Under this heading might be included facts concerning the etiology, semeiology, *post-mortem* appearances, differential diagnosis, and methods of control and prevention.

The beginner would do well to have a note-book with such information summarised for each disease, and it would be found of the greatest value when in the midst of other duties he is suddenly confronted with a disease with which he has had little or no experience.

KNOWLEDGE OF LAW.—It is essential that copies of the various acts and orders and regulations under which the inspector functions should be possessed and kept in a convenient and methodical manner.

Laws lend themselves to easy classification and suitable files should be used for their reception. It is preferable to obtain King's Printer's copies of them rather than trust to books that contain reprints with annotations.

The Ministry of Agriculture and Fisheries wisely issues a very convenient handbook of the acts and orders dealing with matters that come within the province of inspectors appointed in connection with the Diseases of Animals Acts, and all veterinary inspectors should insist that copies of this book be supplied to them by the bodies employing them. The inspector, veterinary or lay, who does not know his statutory powers, will find himself in difficulties sooner or later. The importance of such knowledge requires to be stressed. The writer deplores the fact that many veterinary inspectors are not supplied with necessary information concerning law, but sees that much good will arise from the full use of the veterinary inspectors' sections of many divisions of the National Veterinary Medical Association of Great Britain and Ireland.

It would be well if the various Government Departments would send copies of new legislative measures and relative literature to the editors of the veterinary periodicals.

Several constabularies in this country have issued to their members small pocket books which contain useful summaries of the laws pertaining to the diseases of animals.

The suggestion is here made that the "National" might do something on the same lines for its members.

FORMS.—In connection with public work, they are necessary. They are drawn up with considerable care and are of very great assistance in securing uniformity in connection with restrictions imposed and the information desired in reports.

Were it not for the existence of forms containing questions, some inspectors would furnish meagre reports and others might write treatises,

An adequate supply should be retained by each inspector, and the writer disagrees with the practice adopted in some districts of the veterinary inspector being supplied with the relative form by a police officer when a suspected case is encountered.

The forms invariably state where copies are required to be sent, and the veterinary inspector should retain a copy for reference. The storage of the necessary documents is a simple matter and lends itself to methodical arrangement.

Nests of drawers, foolscap or quarto size, can be obtained at reasonable prices, and form very convenient receptacles. Strong foolscap envelopes are used for this purpose by many, and the outside of the envelope should clearly state the contents.

Under no consideration should a report or form be sent in the same parcel as a specimen.

OVERALL CLOTHING.—In dealing with suspected outbreaks of the scheduled diseases, it is advisable to wear clothing that can be readily cleansed and disinfected.

The wearing of suitable boots and overall clothing is prescribed for veterinary inspectors, who are instructed to inquire into a suspected case of foot and mouth disease.

"The Local Authority shall supply to every such veterinary inspector the boots, overall clothing and disinfectants required to be used."

Rubber or oilskin coats are found the most suitable.

Various patterns of rubber boots are obtainable, but the writer invariably uses those with thick soles and canvas lining. For use with rubber boots, Arctic socks are made, and are found economical.

A veterinary inspector is well advised to carry such equipment with him in his car, and thus be ready for any emergency.

In order to thoroughly cleanse and disinfect the overall clothing a sponge and portable sprayer will be found useful. Sprayers are obtainable that occupy very little room in a car.

OTHER EQUIPMENT.—All veterinary inspectors should possess a microscope, stains, and other items used in connection with the examination of material that cannot be properly examined by the naked eye or hand lens.

Before proceeding to a suspected case of anthrax, the inspector should arrange to take the microscope, slides, staining reagents, blotting paper, cotton wool or tow for plugging the natural orifices, disinfectant, small puncturing scalpel, forceps capable of being disinfected, and a spirit Bunsen lamp.

Cotton wool swabs on wire inside glass or metal tubes should also be taken. Instead of carrying methylated spirit, the writer has for several years used "Meta" or "White Coal" as a convenient and portable source of heat. This substance chemically known as "Metaldehyde," is sold in the form of cakes. It is produced in Switzerland by the passage of electricity through an electric furnace containing coal and lime. It has a decided advantage over alcohol inasmuch as it does not evaporate when left exposed. When lighted with a match, it burns with a light blue flame giving off no smoke, and leaving no ash. No special apparatus is required to contain it when ignited, as it does not melt and run about. When incompletely burned it gives off a faint odour resembling apples, or formaldehyde.

Very much of this interesting material has been used by me for fixing blood smears, for heating stains, and for boiling scrapings taken from sheep affected with sheep scab. For sheep scab duty, the veterinary inspector should provide himself with a good hand lens, tin boxes with glass lids, slides, cover glasses, labels, mounting needle and a small supply of Farrant's Medium.

Paint sticks of various colours are also useful for marking sheep and other animals, and should be carried at all times.

Similar equipment would be suitable for work in connection with parasitic mange of equines.

For taking scrapings a pocket knife, or safety razor blade, can be used.

For swine fever duty, the following equipment should be taken: *post-mortem* knife, bowel scissors, rubber gloves, waterproof paper, receptacles for viscera and the relative labels, together with a supply of the necessary forms.

In connection with foot and mouth disease, the use of a small mouth gag and an electric torch will often be found very useful. The practitioner who finds that he has encountered this disease should take very full precautions before visiting other stock. His car should be thoroughly disinfected and his clothing submitted to gaseous formaldehyde, which can be obtained by pouring formaldehyde solution on to potassium permanganate. For duty in connection with the Tuberculosis Order, and the Milk and Dairies Acts, receptacles suitable for samples of milk, sputum, and other suspected material, should be taken. For the proper microscopic examination of milk samples a centrifuge is a necessity. Various patterns are obtainable at reasonable cost.

In connection with meat inspection, the inspector should possess a suitable knife which can be shut.

OTHER EQUIPMENT USEFUL FOR VETERINARY INSPECTORS.—

Proper office equipment is essential. Filing cabinets—preferably those capable of taking papers of foolscap size—will be found very convenient. A typewriter and its accompaniments are necessary in order to cope with the vast correspondence that comes to the lot of the official who is required to spend very much of his time outdoors, and who has very frequently to answer letters hurriedly on his return. Copies of all letters and reports should be retained. Rulers, compasses, directories, and a good supply of maps are useful adjuncts. Lists should be available for quick reference of all farmers, knackers, valuers, rat catchers, dealers, castrators, and medical officers of rural and urban district councils, in the area in which the veterinary inspector functions. A list of telephone numbers frequently used should be compiled.

The veterinary inspector should know all police officers, medical officers of health and stationmasters in his area.

REPORT OF THE ANIMAL AID WORK OF THE RICHARD MARTIN SOCIETY AT CARRAROE IN 1928.

By KATHARINE LAMB, M.R.C.V.S.,
Carraroe, Co. Galway, Irish Free State.

SINCE the beginning of the work of the Richard Martin Society in Carraroe in 1928, a good foundation has been laid towards the furtherance of the aims of the Society.

Carraroe and the surrounding villages cover an area of 25 square miles. The population in this area is about 2,500. There are 400 householders. Each owns about 15 acres of rocky land, two cows, three calves, six sheep, two pigs and a pony or a donkey. A few people own more than this and many own less—even as little as two or three acres and only one cow. The village is 30 miles from Galway, with no communication by rail, and only bus communication twice a week. Conditions are more primitive than one would think possible. Until now no veterinary surgeon has been available for attendance on the sick animals, since, I think, about 1914, when a Government scheme was abandoned. These are the conditions in the vicinity of the dispensary, but there are miles and miles of similar country.

The more I have to do with the animals here, the more necessary it appears to me, for the owners to have an opportunity of seeking skilled advice, as to the management and treatment of their animals, whether healthy or sick.

Everywhere I go I find results of errors of diet, misjudged

administration of home remedies, interference with natural phenomena, or even absolute superstitious practices. Till now the owners have had to depend on their own rudimentary knowledge, or on the advice of "handymen" who, though well meaning and sometimes sound enough in their principles of treatment, often go far astray over the correct dosage of home remedies. Also, there are many fixed ideas as to feeding, etc., which one finds everywhere and yet which are often quite misplaced. For example, there is an idea that no sick animal must be allowed water. So that the work has been largely educative while advising as to housing, disposal of carcasses, and hygiene generally on every opportunity. All things considered, the animals are remarkably healthy, and except for the ever-present plagues of young animals, I should say a large per cent. of the cases are due to mismanagement.

As to the practical side. A visit to Carraroe was paid by Miss Schaffert, secretary of Richard Martin Society and of the Council of Justice to Animals in Ireland, in order to gain some idea of the conditions. As a result it was decided to build a dispensary consisting of a surgery and consulting room. This has been done, and the building is commodious and practical. A few instruments and simple drugs have been collected. The completion of adequate equipment is now only anxiously awaited so that a weekly dispensary attendance day can be held. This has been impossible up to date owing to the absence of any accommodation for the owners, etc., but owners have known that they could seek advice, treatment and professional visits whenever their animals needed them. Often this has meant that the animals were nearly past hope as the owner "has not wanted to bother me," as he said, which would not be the case if one were known to be at their services at some fixed hour. It has also, I am sure, influenced the number of cases. The number of cows and calves treated is 52, ponies and foals 22, and donkeys 1; total 72, of which 27 were surgical cases and the rest medical. 108 attendances and consultations have been held at the dispensary and 44 visits have been paid. The owners are requested to pay cost price of the medicines supplied, and in the case of a visit a small fee is generally charged. This is not always paid at once, but I find that on the whole the people are very good in coming to pay the small amounts they owe, thus showing their appreciation. Most of the visits are paid on a bicycle, unless they are across the bay, in which case I am rowed in a curragh. Often the cases are the owner's only cow or pony. I remember one case, in which the cow died from sheer weakness and starvation after calving. She was all the stock the young couple had, and they were soon

expecting their first baby. They now only own the calf which is at present under treatment.

The very first case I had was belonging to a widow with 10 small children. Their only cow had been sick 10 days after calving. She had been given a dose about eight times too small. I recommended the same medicine, but the right dose and the cow was better the next morning.

Another case was of a widower with four small children. His only cow had been bad a few days with red water. He had followed the quack treatment popular in the district, which seems to ignore the most frequent complication of this disease. The cow was very bad when he came to me. With proper treatment she improved in a few days and recovered.

But, of course, one is not always so fortunate. One pony, the only stock belonging to a very poor man with 10 children, was stricken with paralytic hæmoglobiuria and died within three days.

Another cow, bleeding internally, died before I reached the farm.

Of course one is always handicapped by lack of equipment, etc. Often I have had to borrow the teat syphon of the local shopman for the treatment of milk fever. I was lately called out of bed at 3 a.m. to a young calf with tympanitis, which was suffocating when I got there. I quickly punctured with a tiny trocar I have, which, fortunately, was effective, but it will not always be a small calf, and these particular cases are so common here that I always go dreading having to perform emergency puncture of the rumen.

Many more examples could be given, and much more could be said, but perhaps this will be enough to illustrate the kind of work that is being done. To people with experience of town dispensaries with large numbers of small animals mounting up the number of cases, it must seem a very small beginning, but it should be remembered that nearly every case was "in extremis," and that the animals were often the owner's sole means of support.

I hope during the next year to be able to educate the people to the idea of bringing their animals before they get too ill, and also to the fact that a sick pig, sheep, donkey, not to mention dog, can receive attention if only they will send word, or bring them, when showing symptoms of pain.

I feel sure that in the coming year much more work will be done, and that this year's work is only the very small seed of much advancement as regards hygiene, prevention and treatment of disease, and the consequent happiness of the animals under our care.

NOTES ON THE PRESENT STATE OF THE BEASTS OF BURDEN IN MOROCCO.

By R. V. ISHERWOOD, B.A. (Oxon),

Royal Veterinary College, London.

DURING a short visit to Morocco this vacation, I had the opportunity of witnessing conditions, which, if told to me by a third person, I should have great difficulty in crediting.

I landed at Tangier, and even my first day there, I was struck with wonder at the loads which the small donkey, which is the commonest means of transport, managed to bear up and down the steep and narrow streets of this small seaport.

To anyone who has only travelled on the Continent, the poorness of condition in most of the animals soon becomes such an ordinary sight, that it no longer makes one stare in horror. It is not until one returns to England and sees the comfortable well-covered animals of our roads and streets, that the appalling contrast is really grasped.

This applies to an even greater degree to Morocco. I remember distinctly on my first afternoon in Tangier, I was standing at the window of my room in the hotel, which overlooked the harbour. Here were lines of donkeys with their Arab task-masters removing the loads from the small ships moored to the quay. Apparently no load was too heavy for the donkey. I watched packing-cases, which took four men to lift, roped on to the back of these animals, the only protection to the back being a very poorly-padded pack. From the state of the backs, which I was to see, much too commonly for my liking, they were worse than useless.

The loads often totally eclipsed the donkey, so that the animal had to keep its head almost on the ground, and all one saw were four slender legs, which almost seemed to bend with the load.

The cab-horses were truly the poorest crocks that I have ever witnessed. The majority were lame, and the drivers would burl their rickety carriages, often full to breaking point with a whole Arab family, at the steepest gradient. There seemed no end to the endurance of these miserable animals, for they took all the hills as fast as the whip could flog them.

Occasionally one saw a truly fine specimen of horse-flesh, ridden by a wealthy Arab.

From Tangier I travelled by road to Rabat, where the conditions were very similar, but I witnessed here one sight which literally makes me sick to think of it.

Three donkeys, heavily loaded with drums of oil, one in each pannier and two placed between on the pack, were coming towards me.

The drover was encouraging the last of the three by the usual means, and to my horror I perceived that the poor beast was not merely lame, but was so down on the off-foreleg, that the back of the fetlock-joint was very nearly touching the ground.

Although this was the worst case I saw, the general practice seems to be to work the beasts till they are positively unable to take another step. It was horrible, and had I not actually seen it, I would not have believed such to be possible in the year of our Lord 1929. From Rabat I travelled by motor to Féz. Generally speaking, the animals at work in the country districts seemed better cared for, although, of course, they were all carrying prodigious loads. The practice of hobbling is resorted to in the case of both horses and oxen, and the method of tying the two forefeet together seemed by far the most common, although I did see a few cases of fore to hind.

It struck me that the hobbles in every case were very much tighter than necessary, as the feet couldn't have been drawn much closer together, if the legs had been round all the way up.

It was in Féz that the terrible prevalence of saddle and harness galls struck me most forcibly.

I have seen pack-horses, when their loads and packs have been removed, dripping blood from 10 or 12 different sores.

In the majority of cases nothing seems to be done to alleviate the continual pain that must ensue from these wounds.

Absolutely by chance, the morning before my departure from Féz, I came across a veterinary station in the centre of the old town. An American lady had started this very good work and was luckily present when I walked in. As soon as she heard that I was a veterinary student she gave me full permission to examine all the work and the many patients. I was introduced to a French veterinary surgeon who was directing all the work.

Never in my life have I seen such a crowded courtyard.

In this old Moorish courtyard, under the most unfavourable conditions, the work was being carried out.

To every conceivable post or rail, horses, mules and donkeys were tethered.

Cases of fistulous withers, poll-evil, sore backs, sprains and evil-looking wounds were all huddled together. I was terribly sorry that my time was so short, but from the veterinary surgeon in charge I soon learned a large number of their difficulties. In the majority of cases they find the greatest difficulty in persuading the natives to allow their

animals to remain idle while under treatment, even although no charge at all is made.

As in most institutions, dependant on charity, the funds are often very low, and there is the added difficulty of obtaining supplies of drugs, etc., at anything except an exorbitant figure.

They had one consolation, however : That the work was becoming increasingly popular and the natives usually returned with their animals after they had witnessed the beneficial results.

So far I have not mentioned the dogs in this country. They are almost better left unmentioned, as they are nearly all in an awful state owing to malnutrition, and quite every other dog is suffering from eczema of one kind or another.

There is, however, one thing I feel must be said in defence of the native. He is often exceedingly poor, and his means of livelihood is his horse, mule or donkey ; and it is a common sight to see the drover, bent double with a load, stagger up the street after his beasts of burden, similarly laden.

THE ELECTRIC STUNNING OF ANIMALS FOR SLAUGHTER FROM THE HUMANE STANDPOINT.

By PROFESSOR MAX MULLER,

Chief Veterinary Inspector at the Abbatoir, Munich.

SINCE the aim of the human slaughterer is to quickly stun and bleed the subject, so any claim to carry out these features must



be of special interest. During the last decade it has been possible to carry out mechanical stunning for slaughtered animals inasmuch as the Belgian shooting apparatus has been quite useful for animals. This procedure has spread more or less into all civilised countries to-day as the quickest method of stunning animals. It is being generally recognised that on grounds of humanity, bleeding without stunning ought not to be allowed.

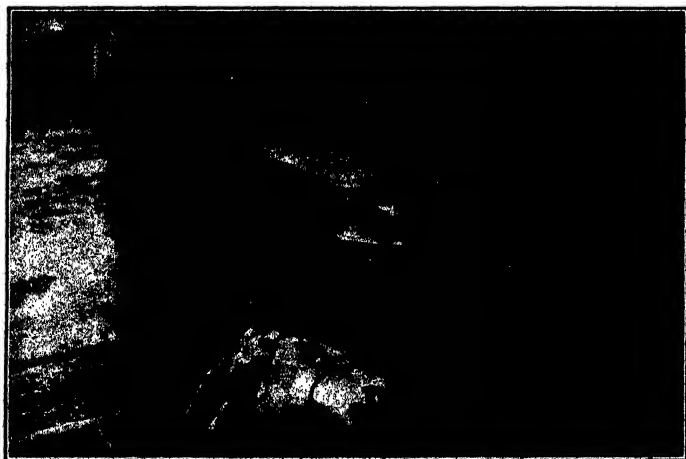
The demand for the usual and effective stunning is not recognised in the ritual of the Jews. The stunning and bleeding of the animal in the form of the Schechita is still recognised by them as a civilised act. The slaughtered animal must have no injury to the brain, so that the captive bolt and humane killer find no place in their slaughter methods.



Trials with electric stunning seem to indicate that the Jewish objections may be overcome. The efforts of Professors Max Muller and Weinberg have made it an accomplished fact. The electric stunning apparatus is laid on to the animal and a weak interrupted current 8,000 to the minute makes the animal momentarily unconscious. The head of the animal is loosely attached by the horns with a cord attached to a hook on a winder and the animal does not stumble from the momentary stunning, but goes down at the hind end. The stunned animal is then lowered gently to the ground. The much objected to pulling about and throwing down process is quite done away with, and by continuing (or while inserting) the current, through the chest incision, the animal can be

bled to death. An easily recognisable sign of complete unconsciousness of the animal until the holding-off of the electric current is the appearance of rigor of the muscles, which momentarily disappears if the current is stopped.

When large animals for slaughter are rendered unconscious in half a minute or longer, the unconscious condition lasts long enough after cessation of the current to bleed the animal to death before consciousness returns. Electric stunning of animals results in a quicker and more painless death more peaceably carried out. The process must be carried out by the slaughterer in a humane way, and then it is painless and the animal is well bled; and it does not involve danger to the operators in the fixing and casting of the animal.



If the electric current is taken off, in a minute the animal may go from the side position on to its chest, lift up its head and get up again after two or three minutes. With the occurrence of rigor in the chest and respiratory muscles the breathing becomes very laboured. Cessation of the application and returning to consciousness is followed by deep expirations and respirations.

The setting up of electric stunning devices for the slaughtering of animals will further the cause of humanity. The question of the stunning of animals for slaughter, to the humane slaughterman, is a matter which is not a party, political, or religious one, but one that must be answered from the point of view of humanity and justice to animals.

SHEEP SCAB IN GREAT BRITAIN.

Conference Between The Royal Agricultural Society and the Ministry of Agriculture.

THE increase in the number of outbreaks of sheep scab in Great Britain has become so alarming, that on March 6th, 1929, the Minister of Agriculture, attended by Mr. J. Jackson, M.R.C.V.S., Captain Briscoe, M.P., and Mr. Houghton, received the deputation from the Royal Agricultural Society and the Sheep Breeders' Association in order to discuss what could be done to lessen, and if possible stamp out the disease.

Sir Merrik Burrell, Captain Johnstone and Mr. Alfred Mansell represented the R.A.S.E., and Mr. Egerton Quedsted and Mr. Stilgoe the Sheep Breeders' Association.

A lengthy discussion took place, the whole situation being carefully reviewed. It was agreed by all that although the current Regulations of the Ministry of Agriculture are sufficient and need no alteration, yet the present position is deplorable. Therefore, the gravity of the fact that the outbreaks of this disease are to-day as frequent and as widely spread as they were 20 years ago, in spite of every kind of official effort to reduce them, cannot be exaggerated.

It was agreed also that the suggestion of a double dipping order (i.e. dipping twice within 14 days) for all counties, is unwise and illogical. Success is more likely to be obtained by concentrating the efforts of inspectors, and the expenditure of money, on those counties where the disease is known to exist, rather than by squandering them over the whole country, and putting sheep owners in clean districts to the annoyance and expense of double dipping their sheep in order to cure them of a disease which they have not got.

The failure of the well-conceived regulations of the Ministry to achieve any sort of result is due to two factors :—

- (i) The farmers in sheep scab areas do not take the trouble to round up all their sheep at dipping time, and leave many scabby sheep behind on the hills.
- (ii) They do not dip efficiently those they do collect. The sheep are not properly immersed, and the dip is not kept at proper strength. Sometimes they do not even use proper sheep dip at all.

The carelessness, and evasion of the duty of carrying out the regulations, is caused by the fact that many of the men do not look upon sheep scab as a serious trouble and a disgrace to have on a farm. In Australia and New Zealand, where people think in terms of "sheep" and where the solvency of the country depends on the wool clip, public

opinion, and the farmer's own interests, forced them to take such drastic and concerted action that the disease was quickly stamped out.

In this country that is not so. Here our wool trade is a minor matter, and there is too little public opinion behind the official regulations to ensure their enforcement. This causes men with scabby sheep to hide them instead of reporting them; one farmer shields the next instead of reporting him, and when the Ministry's inspectors discover cases of non-reporting, and of omitting to dip, the fines imposed are insignificant. In the last quarter of 1928 the Ministry prosecuted in 53 cases. In three cases adequate fines were imposed. In the remaining 50 cases the average of the fines was £3 2s. 8d. In Wales the average fine was £1 9s. 3d.

Another very disquieting aspect of the situation is that out of 743 outbreaks in 1928, 22 per cent. were not reported, but were discovered by the inspectors. There is no doubt that many other cases exist which are neither reported nor discovered.

The policy of putting the onus of having sheep scab among his sheep on the farmer, and of punishing him for having it on his farm was tried in 1923, and had to be withdrawn as it only increased concealment and consequently the spread of the disease.

During the past five years the Ministry has sent teams of inspectors into the worst area, i.e. North Wales, to lecture and assist the local authority in rounding up sheep and supervising the dipping in each area. But success was not attained owing to the apathy and deliberate obstruction of some of the local farmers. Very few attended the lectures. When the big drives of sheep were organised, if scabby sheep were found, some of the men would even tie the sheep's legs and leave them in the bracken so that they should not be discovered and the owners blamed for not reporting.

Wales, and especially North Wales, may be the worst districts, but it would be unwise, and unfair, to blame those areas alone. There are parts of Scotland and of England also where conditions are nothing less than a disgrace.

Certain clean and adjacent counties have formed themselves into groups, and, although allowing mutual unrestricted movement of sheep, allow no sheep from outside to enter a market in their group area unless double dipped or to be double dipped after arrival on private premises.

But of late several cases have occurred when these protective barriers have been punctured, and sheepowners have failed to double dip sheep after they have been imported into the area. Nothing but severe fining of anyone importing sheep without double dipping them immediately on arrival into the clean area, can guard the clean

areas adequately. The difficulty is to get all clean counties to act in concert and on identical lines.

The Minister is of opinion that his staff can be no more successful in their efforts than they are at present, until public opinion is sufficiently educated and aroused so that farmers and magistrates help and support the inspectors. In no other way can the seriousness of non-reporting, of inadequate rounding up of sheep, and of inefficient dipping, be brought home to the delinquent farmers. He would welcome and support gladly any steps which the Royal Agricultural Society thinks desirable to take in this direction.

HYSTERIA IN THE DOG.

By HENRY GRAY, M.R.C.V.S.,

London, S.W.5.

THIS disease has attracted much public attention during the past four or five years, and has given rise to much speculation as to its nature, causation and treatment. It is, however, no new disease, as I shall presently show.

It has no connection with distemper, but in rare cases of the nervous form of distemper, dogs may show hysterical symptoms, as I have pointed out in my article on distemper in Hoare's *System of Veterinary Medicine*, a work published two years before the Great War. Similar symptoms are sometimes observed in maiden bitches when first coming into œstrum, or nine weeks after that period when they often come into milk. In puppies under six months, hysterical attacks have, in my experience, always occurred when they were let loose and allowed to race about in public gardens or parks, or even in the street. It was observed more on a Sunday or on a bright sunny day, mostly after a spell of dull weather, during spring. Not infrequently these hysterical attacks would recur, but rarely after six months of age. The hysterical manifestations in these cases are identical in expression, if not in causation, with the epizoötic or widespread disease.

DIAGNOSIS.—This hysterical malady is distinguished from the epileptiform seizures arising during the course of *distemper* by the fact that it comes on suddenly during exercise, and there has been no previous *malaise*, or symptoms which usually precede the "fits" in distemper. Again, one or two attacks may not be followed by others or there is permanent recovery after disinfestation of the ears. In distemper the seizures are usually followed by others, and in the end death takes place, or the animal has to be destroyed. In some

cases, however, generalised twitchings and choreic movements of the limbs may suddenly appear in otherwise apparently healthy sporting dogs. In meningitis which follows distemper there are no epileptiform seizures, and the delirious whining, crying, or barking, is continuous, or with short intermissions of quietude. As soon as the sedative effect of medicines administered has passed off the delirious whining reappears. In *true epilepsy* or non-infective forms of epileptiform convulsions the seizures are sudden, usually without any preliminary excitement and of short duration. There is always unconsciousness, champing of the jaws and foaming at the mouth; the animal generally falling over and having convulsive movements of the limbs. The seizures re-appear after certain periods of freedom, and may do so for the remainder of the animal's life.

In *rabies* there is no sudden maniacal barking or excitement and no violent rushing about, let alone any period of quiescence. The course is short and sure, almost always ending in death. It is like distemper—an inoculable disease. Fortunately for us, this disease is now non-existent in the British Isles. No doubt in former days hysteria was mistaken for rabies, and the affected were destroyed for that complaint.

This present epizootic or panzootic form did not attract much attention from the veterinary profession until 1882, when the late Professor Nocard of the Alfort Veterinary College, in the environs of Paris, published his observations. Still, however, Guzzoni, of Milan, published a paper on it in 1877, and Mégnin, a retired army veterinary surgeon, who devoted himself to parasitology, and was until his death the editor of *L'Eleveur*, studied this complaint and recorded his experience of it in 1878, 1881 and 1882. Mégnin's communication to the French Biological Society in 1881 stated that a few days previously he had witnessed a peculiar malady in sporting dogs, which, according to their owner, made them look consumptive, and caused them to die, after months of suffering. This state of affairs had been going on for several years among different breeds of dogs, while animals purchased to take the place of the losses were attacked within three or four months, and eventually succumbed. His kennelman was in despair, for in spite of disinfection, limewashing, and other measures, the mortality did not diminish. A dog seriously affected and about to be destroyed was sent to Mégnin, who for eight days kept the animal under constant observation and noted the epileptiform seizures, which occurred generally while at exercise, and also remarked the frantic and almost continuous shaking of the ears. Having examined the interior of these, he found the external auditory canal to be covered with a thick layer of sooty-coloured wax. This, when

examined under the microscope, contained parasitic mites which he had formerly seen in the ears of the other dogs, cats, and ferrets. This finding led Mégnin to recommend antiparasitic treatment to the ears in the pack, and the disease disappeared.

In Nocard's experience certain kennels were particularly scourged by it in spite of medical treatment, hygienic management, crossing the breed or importation of new dogs. In a kennel of 15 couples during eight years more than 60 hounds had either died or were destroyed, suffering from the malady. While the animals are at rest nothing is seen to indicate the existence of the malady. They are lively and in as good spirits as the non-affected, and when out hunting are quite as ardent until, in about half an hour or an hour's run, all at once they give out a loud cry or scream, which the whip at once recognises as the sign of an attack of the complaint and lashes out his whip in order to stop it. The creature then behaves as if at fault, bounds from side to side with haggard eye and foaming mouth, running against anything that comes in his way, until turning in a circle two or three times, he falls down in a state of convulsions. When the fit is over he gets up looking stupid and exhausted or fatigued, and if the attack has not been too violent, he may, after resting a quarter of an hour, emerge from apparent apathy and enter the chase as much as before. When in the kennel one cannot distinguish the affected from the non-affected. But as the disease becomes chronic or the attacks more frequent, the hounds become more sulky and savage than usual; they retire into the corner of their kennel, keep away from their companions, and do not join in their barking or play. At a more advanced stage, the attacks are so frequent and serious and that scarcely have the animals commenced to run, than a seizure takes place; and, if they do not die on the spot, after recovery they refuse to go on. At no time does an attack take place when the creatures are not hunting.

The diseased animals may become completely stupid and quite useless. Sometimes they are *quite deaf*, but at no period have they an attack of the convulsions while in their kennel, so long as they are not excited. Indeed, it would appear that so long as they do not hunt, no matter how active the exercise may be, there is *no* attack, for one of the huntsmen informed Nocard, whom he consulted with regard to the disease, that he could not induce it by compelling hounds to follow his carriage from Versailles to Paris, though these animals were quickly seized with it when hunting.

After a lot of investigation without any satisfactory results as to the cause, Nocard noticed a great number of acari or mites, *Symbiotes auricularum*, crowded on to the drum of the ear, and to settle the

question if these were the cause of the epileptiform seizures he examined a great number of the ears of dogs affected and also non-affected dogs, destroyed or died in the Alfort Veterinary College. All the dogs destroyed for the malady had these parasites exactly limited to the deeper part of the *external auditory hiatus*, and *without anything* to be seen or felt in the external parts of the ear.

In the 30 dogs killed or which died at the Alfort College for various diseases or old age, Nocard did not find acari in the ears of any.

In order to prove whether this parasite was really the cause Nocard placed some of the wax containing the parasites into the ears of non-affected or non-infested dogs. In less than a month the small amount of wax had given rise to numerous prosperous colonies of the parasite, and when these dogs so infested became excited in the chase, they developed the complaint.

On the contrary, when he disinfested the ears of the naturally infested dogs that had shown the characteristic symptoms of the disease there were no more attacks.

Observation has shown that irritation or compression of the nerves of the semicircular canals of the ear will occasion disturbed equilibrium, and fits of derangement, such as fury or sullenness, reflex acts of crying, screaming, scratching, etc. Nocard found no lesion in the affected dog's ears. But Railliet and Cadiot have shown that these hysterical attacks of auricular origin are manifested independently of direct stimulation of the sensory nerves of the ear as the internal and even the external ear may remain unaltered.

I have given you this account by Nocard to show that the epizootic we have been experiencing in these islands during the past five or six years is no new malady. Some have stated it was introduced from the American continent where it occurs and is commonly known as the *frights' disease*. Why from the American Continent when Europe, in which the disease has so long prevailed, is so close to us, is beyond my comprehension of the history of plagues.

Although Nocard did not observe any naked eye lesions in the outbreaks he encountered irritation of the external ear with a more or less discharge, holding the head on one side or constant flapping of the ears, and the running about of the mites are frequently witnessed. But as Nocard observed, one must not run away with the idea that because no lesions or ear symptoms are to be seen there are no parasites.

Beyond the characteristic terrified or anxious appearance of the animal, the sudden yapping or barking and the rushing away as fast as it can go until it is stopped by some obstacle, or becomes exhausted or falls down in a convulsive attack, other symptoms without any exercise are occasionally observed, such as an occasional unaccountable

howl or shriek as if in pain during the night, or fly-catching hallucinations, or an irresistible desire to bite at the feet, hind or fore, or a peculiar nervous crouching on all fours. Ataxia, vertigo, pivoting on hind legs, etc., are sometimes seen. Whether the numerous cases of paralysis of the lower jaw seen nowadays have anything to do with this malady I am not prepared to say. But I feel certain that many cases of the nervous form of distemper are confounded with it. On the other hand, I think, however, it is permissible to allow that this disease may be coincidently associated with distemper, in which a great percentage of cases of inflammation of the internal ear is to be found. It is well to observe that all dogs seized with the maniacal or terrified fright do not develop convulsions. Far from it; the attacks may be shortened or aborted by coaxing.

Not only do dogs, but also cats and ferrets show peculiar nervous systems due to the ear parasites. Kittens, high-bred ones, succumb to epileptiform convulsions, or rush all over the place or climb up curtains in an apparently frightened manner. Even horses, cattle, goats, etc., show similar nervous symptoms.

Many dogs in an affected kennel do not manifest any signs of the malady, a great number have no more than one attack, and others have several and eventually recover without having received any rational treatment. A great proportion of the attacked have had distemper, varying from one month to two years or more, before. It is well to add, however, that some dogs may show the disease when in their kennel.

Now what is the cause of this widespread malady which attacks dogs of all ages after the weaning period, male and female, of all breeds, but the more highly-bred than the mongrel? Although it is noticed more in kennels, it often attacks the only dog in the house when it gets warmed during exercise in the open, even at night time when it is dark. Nocard thinks that increased warmth of the body during exercise favours stimulation of the reflexes.

No end of theories have been wildly disseminated as to the cause of this malady, but they have only arisen from the imagination, and not based on logical conclusions drawn from a proper sequence of observed facts.

Food has been advanced as a cause; that old bogey, and, I am afraid, an everlasting one, "worms," which are invoked as a cause of every imaginable complaint of the dog, rheumatism, colic, and other supposed conditions have been used to account for the mystery.

The reason it is generally observed in a large number of dogs is because the chances of getting the disease from one or another increase in direct proportion to the number. The single dog in a house stands

a remote chance, unless it comes from an infested place, or, as I observed, a case in a country practice where some patient or other introduced it into the practitioner's infirmary, so that his own dogs contracted it.

Why does it occur as an epizootic or a panzootic after long periods of quiescence or mildness? I am afraid that can only be explained by that mysterious law of periodicity not peculiar to the plagues of man, animals or plants, but to the appearance of plagues of lice, mice, irruption of rare birds into places not their habitat or of their usual migration; even of crime, fashion, taste, idea, etc.

Highly-bred dogs, which are more likely to be kept in numbers, are more impressionable than mongrels, and their nervous system is more unstable, and in consequence they have in general more of the nervous temperament, and, therefore, they are more likely to be given to stampeding or become seized with a panic should one of their number during the excitement of the chase develop an hysterical attack. In fact, in such a condition they may develop the malady by imitation, as we have seen in the human being, horses, cattle, sheep, pigs, birds, etc.

I may add, in parenthesis, that some highly-strung dogs develop nervous symptoms from fleas, lice, eczema or other forms of surface irritation. When the back of such is tickled or scratched, they manifest symptoms of the Jacksonian epilepsy type. This is, however, much commoner in the cat.

It is observed more in the autumn, winter, and early spring, than during the warmer weather. The reason of this is that most acari or mites which live on the surface of the body go deeper into the cavities to obtain more warmth during the colder weather, and in the warmer weather they live more on the surface. This seems almost a law with acari affecting animals. Again, sporting dogs are used for the chase during the colder months.

There is only one exciting cause to this specific malady so far as my observations go, and that is the ear-mite, *Symbiotes auricularum*. No English author but Steel refers to this malady, but it appears in several translations from the French, in whose textbooks it is described as the epileptiform convulsions of auricular origin of sporting dogs. Cadiot and Breton in their superb little work on canine medicine, designate it as the contagious epilepsy of kennel hounds.

I have never had the opportunity to examine a dog which has died of this malady, so that I am not in the position to say that when one cannot see the parasites in an ordinary examination, they are not present out of sight. Acari leave dead animals when cold, as Mr. Richardson, who is present, can testify from personal experience.

So unless one examines a dead dog as soon as possible after death, one may not be able to find them.

There is one thing that is certain, and that is if the ears are disinfested, or rather disinfection treatment is carried out, the disease disappears from a kennel or does not recur.

In an outbreak in a kennel all dogs should be treated simultaneously and the place thoroughly disinfested to prevent re-infestation. By this treatment the place is ridded of the malady, whereas other systems adopted have generally failed and given rise to serious losses and much anxiety.

During the attack the animal should, if possible, be seized and then confined in a dark, quiet place and left alone for it to pass off. If it should be deemed necessary to give a sedative to cut short the excitement, it is best administered hypodermically.

To prevent nervous excitability after the attack, a saline sedative may be put in the drinking milk or water twice a day for a few days.

On no account should a nervous person be allowed to interfere with a dog during a maniacal seizure, as such in losing control of himself or herself is likely subconsciously to place one or both hands between the dog's teeth when it is convulsively opening and shutting its jaws, and in consequence become more or less seriously bitten.

Dogs in these attacks are not conscious of what they are doing, and therefore they should not be classified as savage.

I have only dealt with this subject summarily, and from an effect to a cause point of view. If I had adopted the opposite—from cause to effect—I might have been able to show what numerous effects these mites in animals' ears have. They are the commonest cause of ear-trouble, and a frequent cause of nervous disturbance.

In conclusion, let me repeat this is no new disease, and that it may be readily overcome if proper treatment is adopted or precautions taken.

Clinical Articles

A Recurrent Case of Spavin.

By T. A. COCKSEGE, M.R.C.V.S.,

Chief Veterinary Officer, British Somaliland.

IN 1926 a four-year-old gelding native pony, the property of an officer, was brought to me lame behind, with no history. On examination I was unable to give a positive or even a tentative diagnosis, and was forced to play for time. The owner, being a calm and sensible person, and not expecting miracles, I had a free hand. I had my suspicions, both from the action and from a slight wasting of the muscles, but was quite unable, for a month, to discover anything definite, there was never any decided heat or pain, and the animal would improve slightly, and, then, be as lame as ever. Finally, a very small exostosis appeared at the seat of Spavin, and I puncture fired deeply into the exostosis. The animal, after a further six weeks, became quite sound, and has played polo, trekked long and tiring journeys, and done his work thoroughly for over two years. A few months ago, he had a fastish gallop up a dry river-bed, which was pretty heavy in parts with sand, and that evening he was "cat-lame" in the same leg. I examined him the next morning, and could find no reason for the intense lameness; he was unable to use the leg at all. I decided to put his hock into antiphlogistine, and await results. He improved slightly, and I came to the conclusion that it was a recurrence of the old complaint, and that something had either excited a fresh Ostitis or inflammatory phenomenon within the hock, and that I had again to deal with an arthritis. I this time decided to rest the animal, only applying a mild blister, in order to gain my end, rest. The animal made a complete recovery. In my experience, if once you have had recovery with a distinct Exostosis and Anchylosis, the recurrence of such acute symptoms, as in this case, are distinctly rare, and, moreover, the animal had been in hard condition, doing hard and strenuous work for two years. Incidentally, on his river-bed gallop, he had a far lighter weight than usual.

Chronic Debility of Camels, Caused by Hydatid Cysts.

By T. A. COCKSEGE, M.R.C.V.S.,

Chief Veterinary Officer, British Somaliland.

DURING the last four years, I have been dealing a great deal with camels of the Somaliland Camel Corps, and I have had in the ordinary

course of my duties to examine numbers of animals, shown up by executive officers for casting. A great number of these animals are brought with the history of being bad doers, no use on trek, etc. etc.

Two years ago, I demonstrated a Trypanosome in this country amongst camels, so am always on the look-out for Surra, and, unless it is decided to destroy such "casters" immediately, they are invariably isolated as suspicious cases. Many of these camels are reasonably young animals, and a genuine attempt is made to keep them serviceable, but a certain percentage are destroyed eventually as "chronic debility cases."

I or an Indian veterinary assistant, invariably make *post-mortems*, and in a very large percentage of cases, we find the lungs and liver, especially the lungs, invaded to an enormous extent with Hydatid cysts, from the size of a pea to that of an orange. I have actually counted as many as 40 in the lungs alone. It is small wonder that the animal is a chronic debility case! I see no chance of either diagnosing or treating.

I am not in a position to say what is the adult cestode, but I suspect some parasite of the jackal, as they are very common, whereas the dog is an uncommon animal in this country. All these camels are bought in Aden, are Arabian camels, as the native camel is unsatisfactory as a riding camel, but why an Arabian camel should be more susceptible to Hydatids than the native camel I fail to understand, but it is most uncommon to see a case amongst the native animals. I note in the "One-Humped Camel" by Leese, he says it is not a very serious pathological condition. To my mind, in this country at any rate, I put it next to the various forms of arthritis in the list of causes of wastage.

Report on Microfilaria in Horses at Mona.

By S. K. SEN.

The average length of the microfilaria, as based on measurements taken of 11 specimens, was 194 microns, the individual measurements in microns being as follows:—

200, 200, 200, 150, 170, 230, 200, 190, 170, 200, 220.

The "fixed spots" could not be located with certainty owing to the specimens having undergone shrinkage, so that a provisional diagnosis had to be made on the length of the specimens alone.

The following species of "filaria" have been recorded as being parasitic upon horses:—

- (1) *Parafilaria* (York and Mapleslone, 1926) *multipapillosa*, Condamine and Drovilly, 1878 (*Filaria hæmorrhagica*, Railhiet, 1885).

In the literature available in the library of this Institute, no definite indication is available as to the occurrence of the embryos in circulating blood. According to Neveu-hemaire (*Parasitologie des Animaux Domestiques*, 1912) and Railhiet (*Traité de zoologie médicale et Agricole*, 1895), the liberated embryos measure from 220 to 230 microns in length. As is well known, the adult filariæ occur in the subcutaneous connective tissue.

(2) *Filaria spirovoluta*, Smit & Ihle, 1925.

The microfilaria which occur in the blood, measure from 160 to 190 microns in length. Smit and Ihle discovered the adults in the loose connective tissue beneath the pectoral muscles of a horse. The length of the specimens in question preclude the possibility of their belonging to this species.

(3) *Setaria equina*, Abildgaard, 1789 (*Filaria papillosa*, Rudolphi, 1802).

According to Neveu-Lemaire (l.c.) and others, the embryos of this species measure 280 microns in length. Wirth (1917) describes at length the embryos of *Setaria equina* which occurred in the blood of Hungarian horses. The microfilaria measured 250-290 microns in length, but stained specimens were always shorter due to shrinkage, and measured only 150-240 microns. According to Wirth, "Shrinkage occurs after the employment of every method, especially after dry fixation."

The following passage, which occurs in Railliet's *Traité de zoologie* (1895) throws further light on the question of the average length of the embryos of *Setaria equina* (the passage is literally translated from the original): "In 1848 Wedl. had observed some embryos (of *Setaria equina*) in the blood of a horse of which the peritoneal region contained a *Filaria equina*. They were 1/7 m.m. (143 microns) long, and were present to the number of 1 to 3 in a single drop of blood. In 1876 Sonsino, likewise, found in the blood of a horse, in Egypt, some embryonic nematodes to which he gave the name of *Filaria sanguinis equi*; on autopsy he discovered again [some specimens of] *Filaria equina*; the embryos resembled those of *F. sanguinis hominis* [*—F. bancrofti*, the embryos of which, when stained, vary from 154 to 311 microns in length], but were very small. Lastly, Lange reported in 1881 that Jakimoff had observed in the blood of a horse affected with hæmaturia and icterus numerous embryos also resembling those found in man."

From the foregoing it would appear likely that the specimens in question represent the embryos of *Setaria equina*.

Translations

Extradural Anæsthesia in Prolapse of the Uterus of the Cow.*

By DR. ARTHUR TOMASCHEK,
of Guntramsdorf.

I WAS led to try this method of anæsthesia by reading a paper given by Dr. Franz Benesch before the Veterinary Society on January 12th, 1926, and published later in *Wiener Tierärztlichen Monatsschrift* at page 130 (1926). I was also influenced in the matter by a loss in my practice that might have been avoided by adopting suitable anæsthetic procedure. I was called to a cow down, and with an everted uterus. I returned it with the cow down all the time, inserted five stitches and put on a truss. Next day all the stitches were broken and the womb out and very œdematous. In spite of all care the cow had to be slaughtered. I now adopt Prof. Benesch's method, and have had great success with it in my practice.

Recently I have had the opportunity to employ the method of epidural anæsthesia in four cases of prolapse of the uterus. The treatment, as given in *W.T.M.*, is simple and consists in injecting 30 c.m. of a 0.75 to 1 per cent. solution of ~~tutocain~~ *tutocain* into the space between the first and second coccygeal vertebrae. Within 10 minutes or earlier straining ceases completely, and with little trouble and without exercise of much force, a womb may be cleansed and bathed with lukewarm alum solution, and the prolapse put back. With this method sutures can be dispensed with, and in no case did I see a return of the prolapse. A truss was always put on. This treatment produces a favourable impression on the owner and saves the veterinary surgeon a lot of trouble from violent straining in a recumbent animal. Moreover, there were no complications from metritis, which is often the case with the old methods.

Further advantages of the local anæsthesia are that there is little danger of a rupture of the uterus because counter pressure is done away with. It robs outside persons from interfering because the accoucheur alone can carry out the procedure. The injection causes no bad results, and no paralysis of the tail or hind parts if the solution is sterile. The effect of the injection passes away in one to 1½ hours.

* *Wiener Tierarzt. Monatsschrift*, Nov. 1, 1928.

It causes no fever or general disturbance and no lessening of milk supply.

In my last case (the fifth) a farrier and a cowman had made unsuccessful attempts to put back a uterus. I was called, and carried out extradural anæsthesia and put back the uterus quite easily. As far as my experience goes, I can warmly recommend the procedure to my fellow-practitioners.

I am going to carry out the procedure not only in prolapse of the uterus, but in difficult parturitions, castrations and eversion of the vagina, as Dr. Benesch advises, and after further experiences shall report results.

The English Distemper Investigations at Mill Hill.*

AFTER giving the record and history of the distemper investigations at Mill Hill, Professor Dr. W. Hinz comments as follows: The active propaganda carried out as a result of the work of the English Commission, perhaps against the desire of the participating veterinary surgeons, has probably raised higher expectations than the details of the Report justify. It makes some remarks on the report presented necessary. From individual communications several questions arise to be answered. From the majority of these questions and incomplete knowledge of the research up to date at Mill Hill it appears to me that the distemper problem is no further elucidated. The Commission has turned to the manufacturers concerned in order to obtain a supply of distemper serum (according to Mill Hill) and also ensure the same for Germany.

A critical judgment of the Report is easy to make from its smaller *positive* side and its greater *negative*.

As regards the *positive* findings of the Report it is frequently repeated and stressed that it is now possible to obtain a protective inoculation against distemper, *but this is nothing new*. As mentioned in the Report, Puntoni in 1924, and Lebailly in 1927, had already furnished proof that with formalinised organ derivatives it was possible to grant protection against canine distemper (a distemper vaccine according to Lebailly, and the English distemper commission, was produced free at the Perleberg Vaccine Works). The Mill Hill investigations confirmed this previous work, but with the limitation

* Tierärztlichen Rundschau, 1929, Nos. 3-4-5.

that it had not been sufficiently tried out in practice, so that they investigated the problem again. But an absolute success of this protective inoculation is not at all clear or certain from the Report. Also the value of the findings as regards inoculations is curtailed or stultified by the *non-inclusion* of reports from the animal owners. Any favourable judgment by the laity on this account, and through the non-inclusion of these reports, must appear optimistic. I hope in the interest of the English authors that the death of numerous dogs after, and in spite of, the Mill Hill inoculation, will not be reported, and the inoculations declared useless. Moreover, clear information is not given as to how the difficulties of virus production in a satisfactory way (amount, standardisation, dose) may be surmounted. As *positive* findings it is further stated that distemper produced in healthy dogs by transmission of infectious material is *characterised* as "an acute, feverish, infectious disease which has an incubation stage of four days and is accompanied by gastric catarrh, intestinal disturbances, inflammations of the respiratory tract and now and again nervous complications." *This declaration about the disease is nothing new.* It is only the *confirmation* of a fact as to aerogenous infection (Eckert, Jonatt, etc.) which has long been known (compare Krajewski's experiments in the year 1881). Also the irregular course of the fever is nothing new, since the scientific designation of distemper as an intermittent catarrhal and nervous infection of the dog is already known (compare Jakob and Henichen on the Incubation Stage and Initial Symptoms of Canine Distemper, Inaugural Dissertation, Berlin, 1913).

That the ferret can exhibit the similar distemper symptoms to the dog was shown by M'Gowan in 1912 and is already known. On the other hand it is new that inoculation material for the dog can be kept up from the ferret. But this method has not been continued, so that again homologous vaccination material was resorted to.

With the observation that distemper artificially produced is not such a devastating disease—except in the nervous cases on which no reports could be made, since such dogs in every case were killed—but that secondary infections brought about a bad course, I pass over the *negative* part of the English Report.

The following proposition from *The Field* appears to me especially characteristic: "When the investigations began they were rendered more difficult on account of two theories on the cause of distemper. If these had only *one* recognised cause to work on whose source, character and effect was to be investigated, then the research would have been essentially simpler!" If one assumes chiefly with Carré and his investigations that the cause of distemper's last end is an irritant

and excitant virus, then there are quite a number of theories, conditions and circumstances to keep in view in distemper investigation; quite apart from the secondary infections which in to-day's knowledge of the disease cannot simply be put aside. Also *a priori* there are not *only* two theories, but indeed *several*, if one must clear up conclusively the problem of distemper.

The literature of the disease has only been limited and imperfectly viewed in the English Report. Schroder in his monograph on distemper in 1925 mentioned 657 works which he had found serviceable in his distemper investigation. I fear that the *one-sided* view of the bacteriological side taken by the English Commission is unfavourable to the clinical aspect of the disease. If from literature it is assumed that only two causes exist for the disease many possibilities are passed over. There is no reference to the eventual protozoic or parasitic nature of the causative agent (Lentz, Sikora, Kantorowicz, Lewy have all referred to this) and to the possibility of avitaminosis especially believed in by the Russians. Also Reinhardt and Siefried believe in avitaminosis if not as a cause, at least as a predisposing and complicating factor.

Differential diagnosis is not gone into, but needs more attention. Dr. Hinz remarks on a whole rank of ailments in the dog that he considers may be due to ascarides, e.g. catarrhal conjunctivitis, catarrhal gastro-enteritis, catarrhal pneumonia, nervous twitchings, masticating cramp, paralyses and so-called distemper pustules. Who can say with certainty to-day what distemper is, what affections are due to ascarides and what to secondary infection? Compare here also the feverish angina tonsillaris of the dog, according to Carlin.

Finally, all the *secondary infections* are too cursorily dealt with. According to the Report, distemper in its classic form is harmless "an infection is *seldom fatal*, the *prognoses favourable*" the evil enemy occurs as secondary infections. For the veterinary surgeon and dog owner the name is "sound and smoke." Most important to them are *those* forms of the disease which cause numerous *deaths* and evil after effects. On these grounds I hold it as deplorable that the material in the nervous complications was not made use of and that "*every animal that had nervous attacks was killed with chloroform*; and that on this account on the later stages of the nervous cases nothing is reported."

Summarising, it appears to me that the *positive* findings in the Mill Hill research furnish nothing new, but only confirm known facts. On the *negative* side there is a disease complex, only one narrow aspect of which, under the name of distemper, has been investigated. Further reports and, above all, *positive* confirmation from practice of beneficial results obtained from the research, are necessary.

Reviews

Report of the National Dog Week Council. A full report of the successful work done by the above in aid of the Chair of Canine Medicine and Surgery in the Royal Veterinary College, can be obtained by any member of the profession upon request. Apply to Capt. H. E. HOBBS, Hon. Organising Secretary, 37-38, Temple Chambers, London, E.C.4.

THE following are points from the Report which was issued on the 6th of March last :

Co-operation in the scheme was effected in over 900 localities.

1,734,065 pamphlets and leaflets were distributed.

The N.D.W. Film was shown in some 500 cinemas.

Two B.B.C. stations broadcast N.D.W. Talks.

350 newspapers lent special propaganda aid.

31 Greyhound tracks co-operated in the N.D.W. Greyhound Racing Sweepstakes (281 dogs entered) which realised approximately £2,000 for the R.V.C. Fund.

The Tail-Waggers' Club inaugurated in National Dog Week had a membership of 15,785 at the end of 1928. (Membership to-day 29,242).*

63,000 letter headings were used in the 4 months of active preparation. 30,000 posters were exhibited, these involving 511 separate local "overprintings."

£5,000 was passed to the Royal Veterinary College Canine Diseases Appeal Fund.

U.S.A. is copying the scheme even to the slogan,

* The number is now over 40,000 and increasing daily. Every new member adds 2/- to the R.V.C. Funds.

Diseases of Animals in Tropical Countries. By C. R. EDMUNDS, M.R.C.V.S. and COLONEL G. K. WALKER, C.I.E., O.B.E., F.R.C.V.S. 2nd Edition. Pp. 407; 37 illustrations. London: Baillière, Tindall & Cox. Price 25s. (Postage: Inland, 6d.; Abroad, 10d.)

We recommend the second edition of this very useful handbook, which should be in the possession of every graduate of the Royal College of Veterinary Surgeons who is destined to spend some years of his life amongst the diseases of animals in the tropical countries. It is only eight years ago since Mr. Edmunds, at that time the Assistant Chief Veterinary Officer, Rhodesia, published his book entitled "Diseases of Animals in South Africa," and in bringing out a second edition of this valuable little work he has wisely changed the title to that of "Diseases of Animals in Tropical Countries," and taken in as a collaborator Colonel G. K. Walker, who is well known amongst his veterinary colleagues, not only as being of great experience in the diseases of animals in India but one whose name is second to none in enthusiasm for anything which is likely to be of benefit and value to his profession.

The text, which is divided into three parts, includes (1) the Diseases caused by Vegetable Parasites; (2) the Diseases caused by Animal Parasites; and (3) Diseases caused by Undetermined Viruses. Each is, as might be expected, divided into sections or chapters which include full and detailed descriptions, in many cases illustrated by photographs or

plates, of practically every disease which is likely to be met with in tropical climates.

It is not possible, nor is it necessary, to select any particular portion of the book for special description, as all is interesting, and we can, with every confidence, say that it should find its place on the book-shelf of every student and practitioner who has anything to do, either directly or indirectly, with the diseases of animals in tropical countries.

Personal

Mr. JOHN C. GRANT, M.R.C.V.S., has been appointed Lecturer in Veterinary Hygiene at the North of Scotland College of Agriculture, Aberdeen University, in the place of the late Mr. Wm. Brown.

DR. W. H. ANDREWS, Director of the Veterinary Laboratory of the Ministry of Agriculture and Fisheries, has been selected to represent the Ministry at the Pan-African Veterinary Congress to be held in South Africa this summer.

Notices

R.A.V.C. Annual Dinner.

THE Annual Dinner of Officers of the Royal Army Veterinary Corps, past and present, will be held at the Hotel Cecil on Friday, June 14th, 1929, at 8 p.m.

Those desirous of attending should inform the Honorary Secretary, R.A.V.C. Dinner, War Office, Whitehall, London, S.W.1.

Ban on the Importation of Hatching Eggs into Denmark.

THE Danish Ministry of Agriculture on February 25th, 1929, issued an Order prohibiting the importation into Denmark of eggs of all kinds for hatching. The importation of all other kinds of eggs is only permissible through importers licensed by the Danish Ministry of Agriculture.

Preparation

Lomocain. A New Local Anæsthetic.

WE have recently had the opportunity of testing the value of a new local anæsthetic which has been named Lomocain, and is much used in human dentistry. Lomocain is stated to be composed of a mixture of chlorethane, cocaine, adrenalin, and normal saline solution, and is put on the market by the Wynost Manufacturing Company, Manchester. Its trial proved that it gave a satisfactory local anæsthesia, and for the horse there is very little danger in its use; but for the dog and cat one must not forget that it contains cocaine, and that when using it, the proportionate dosage of this drug must always be taken into account.

THE VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING,
OFFICIER DU MÉRITE AGRICOLE (FRANCE),
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HONORARY MEMBER OF THE AMERICAN VETERINARY ASSOCIATION,
PRINCIPAL OF THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor :

GLADSTONE MAYALL, M.R.C.V.S.

MAY, 1929.

Editorials

THE COLONIAL EMPIRE AND VETERINARY SCIENCE.

IN a speech made before the 26th Annual Dinner of the Corona Club on May 6th, Mr. Amery, the Colonial Secretary, said that " He hoped before many years were out to make the Colonial Empire a model to all the world as regards development of Agricultural and Veterinary Science. They were still only in the beginning of their efforts in the field of health. But no task before the Colonial Office could be greater than that of proving itself a real Ministry of Health to the tropical world."

CASEOUS LYMPHADENITIS IN SHEEP.

IN our Editorial for March we drew attention to the question which had been raised in Parliament in regard to the importation of mutton suffering from Caseous Lymphadenitis, and we also drew attention to the statement that between December, 1928 and February, 1929 over 21,000 sheep carcasses out of a total of 284,000 were found, upon

veterinary inspection, to be suffering from this disease ; over 17,000 being discovered in the London district. By an error the impression was given that these came from New Zealand ; whereas, although the disease is known in that country, the proportion found in New Zealand carcasses was very small indeed—in fact out of 3,000 carcasses examined only two were found to be affected.

HUMANE SLAUGHTERING AND SPLASHING.

THE subject of the cause of “splashing” of the flesh of pigs has received a fresh impetus by an original research and report upon the subject by the well-known authority and expert, Mr. Thomas Parker, F.R.C.V.S., the Veterinary Officer who is in charge of the abattoir at Newcastle-upon-Tyne. Although an article of length, we publish it in full, as every part of it is of interest to both student and practitioner, and Mr. Parker has followed up the subject in a detailed manner which has enabled him to be emphatic in his assertions and conclusions.

To the third year or final student, about to present himself for the Examination of the Royal College of Veterinary Surgeons, it is likely to prove most useful, and for the practitioner who is already installed as one of the guardians of the public welfare, it will prove most interesting reading.

Mr. Parker has carefully studied the various ways of killing, and applied his knowledge to a practical result ; as the opinions which he gives in this article are not only the result of his own unbiased observations but are also deductions carefully made in the light of a mature judgment.

However, our readers will be able to read it for themselves, with, we are quite sure, the necessary frame of mind to be able to judge the question of “splashing” amongst other things, impartially and in English fashion.

General Articles

HUMANE SLAUGHTERING AND SOME EXPERIMENTS BY VARIOUS METHODS OF STUNNING, WITH SPECIAL REFERENCE TO THE CONDITION KNOWN AS SPLASHING.

By THOMAS PARKER, F.R.C.V.S.

*Veterinary Officer for the City and County
of Newcastle-upon-Tyne.*

DURING recent years the question as to whether the use of mechanically-operated instruments for stunning purposes should be made compulsory and applicable to all animals slaughtered for food purposes is one that has given rise to a considerable amount of discussion. Some hold that mechanical slaughtering has no advantage over the traditional methods in the prevention of unnecessary suffering ; others believe that by the use of mechanically-operated instruments the carcasses may be seriously deteriorated, whilst there are many who contend that the ordinary method of killing is much more humane than the Jewish method. As the subject is somewhat complicated, it is proposed to briefly refer to some of the difficulties in stunning, some differences from the humane standpoint of the various methods of killing, and submit some explanations as to the probable causes of splashing and other forms of faulty bleeding, besides illustrating, by a description of experiments on sheep and lambs, the methods by which, during the use of mechanically-operated instruments, they can best be eliminated.

Some Difficulties in Stunning.

Difficulties are more likely to arise in the stunning of large boars and sows than with the other larger animals such as cattle. As an example, one may refer to a complaint the author received during October of last year concerning the slaughter of a large sow.

It appears that a captive-bolt instrument was used in two successive attempts to stun and in each instance the bolt failed to penetrate the skull. Whether or not, on this occasion, the bolt was suitably adjusted and the proper strength of cartridge used, or the aim was properly directed, are matters concerning which one has no definite information. The slaughterman who killed the animal and dressed the carcass states that after the captive-bolt instrument had failed

the animal was stunned with the hammer, but did not fall until after five blows had been delivered. This case illustrates the type of animal one may expect to find periodically when slaughtering old or large boars and sows, but may be regarded as an exception to the rule. Owing to the peculiar shape of the skull, the enormous development, denseness and toughness of the frontal bones and the comparative smallness of the brain in some of these animals, it is well nigh impossible to stun them without the deliverance of several blows which only succeed by gradually breaking down the parts struck, thus permitting penetration of the brain.

In some parts of the country pigs are always bled without previous stunning, the animal being suspended by a chain attached to a hind limb and then stuck while in that position. Within this City, however, it has always been the practice in pig killing to stun the animals before sticking. When dealing with small pigs the slaughterman frequently stuns one or more while they are lying down, standing or attempting to escape amongst their fellows. The stunned animals are then pulled out from amongst the others and bled on the slaughterhouse floor. When the animals are not under proper restraint the part of the skull aimed at may be missed and that is one of the reasons why felling with the hammer fails, from time to time, to stun the animal at either the first or second attempt. When a large pig, such as a boar or sow, is about to be stunned, the head is invariably steadied by means of a rope attached to the upper jaw. When failure to stun any of these animals either at the first, second, third or even the fourth blow of the hammer occurs it is usually because the slaughterman, although correctly aiming each time, is physically incapable of breaking through the skull towards the brain owing to the enormous resistance offered by the dense bony tissue.

The object of stunning as the first act in the process of killing is, of course, to render the animal unconscious instantaneously and thus eliminate the possibility of unnecessary suffering. To achieve that object the animal must be so controlled that when the slaughterman proceeds with the stunning it is unable to suddenly move its head from the desired position. Cattle are usually secured head downwards by means of a rope attached to the neck as a slipknot, the free end being passed through a ring on the floor, drawn tightly and made secure to some fixed object. With reasonable care there should be no difficulty in securing cattle in the desired position for stunning, not only with comfort to the animal, but with safety to the slaughterman, providing the premises in which the animals are to be slaughtered are properly arranged.

It is scarcely necessary to refer to the methods of restraining sheep

and lambs, for they are comparatively easy to handle. In the matter of securing for the purpose of killing, pigs undoubtedly give the greatest amount of trouble. Perhaps one of the best and most certain methods of securing pigs is by the use of what is known as the Dutch pig trap. When used in a modern pig killing abattoir, the animal is driven from a pen through a doorway leading into the trap. By operating a lever the animal is immediately suspended with all feet off the ground, the whole body, including the head, being immobile. In this position the animal is stunned after which by again operating a lever, the body is tilted on to the floor where it is stuck.

Unfortunately, the arrangements within the majority of small private slaughterhouses do not permit of the use of these appliances, and it is certain that so long as pig slaughtering is permitted under such conditions so long will much unnecessary suffering occur.

The Advantages of Mechanically-Operated Instruments.

No matter what our individual opinions may be as to the comparative values, commercially, of the various methods of slaughtering practised in different parts of the country, it is scarcely possible to dispute that the most humane method of killing any animal is that which brings about instantaneous unconsciousness as the first act in the process.

In slaughtering one of the large animals, such as a bullock, providing the animal falls unconscious at the time the first blow with the hammer or pole-axe, or the penetration of the brain by the captive-bolt of a shooting instrument, has occurred, it may be considered that insensibility has been produced instantaneously. On the other hand, when a similar animal, after being secured by ropes in the desired position, is slaughtered by the Jewish method, it is possible and it is usual for the throat to be cut in such a manner that the operation may be considered to have been performed almost instantaneously. It must be remembered, however, that by this method not only is it necessary to cut through about nine inches of hide, crosswise, but also to sever the windpipe (trachea), gullet (œsophagus), muscles on either side of the neck and the large blood vessels, and nerves, thus causing a gaping wound extending across the throat from ear to ear. Whilst unconsciousness by this method, cannot be said, to occur instantaneously, it does, nevertheless, quickly follow the rapid expelling of blood, and the cutting off of the main circulation to the brain. If, then, one compares the two methods of killing, from the point of view of humane slaughtering alone, that which requires stunning before bleeding is much to be preferred to the Jewish method, for the reason that by the former the animal is rendered unconscious at the moment the pole-

axe strikes the skull or the bolt enters the brain, whereas by the latter method the animal is conscious at the time the skin, muscles, trachea and other tissues of the throat are cut.

If the act of cutting the throat by the Jewish method be imperfectly done then a greater amount of pain will be inflicted and the period elapsing between the act of cutting and the onset of unconsciousness may be extended. Again, when, by reason of accident or otherwise, the first two or three blows delivered to the skull with the pole-axe fails to stun the animal, a certain amount of pain must of necessity be inflicted. Not only by this method but also by the Jewish method, the prevention of the infliction of unnecessary pain during the act of killing depends almost entirely upon the physical ability, skill, and care of the slaughterman, providing, of course, that the premises in which the slaughtering is carried out are suitably arranged, roomy, well lighted and fully equipped with the essential appliances.

To stun large bulls, bullocks, boars and sows requires, as a rule, more than average strength and dexterity on the part of the slaughterer. Some men are almost always physically fit ; others vary from time to time. Occasionally, even with expert and physically fit slaughtermen, when a blow is about to be delivered for the purpose of stunning, the animal, being somewhat wild or restless or imperfectly secured, suddenly moves the head, the result being a most undesirable scene. Men become expert by practice, and from the moment the youth commences as a mere novice, until he has served his apprenticeship and become an expert, he obtains his experience within the slaughter-house upon living animals so far as the process of killing is concerned. Human nature being what it is, there are varying differences between individuals concerned in any particular business.

Some youths rapidly become expert slaughterers ; others with years of experience with great difficulty pass the novice stage. With most individuals concerned, the question of physique, temperament, training, and mode of living, combined, largely determines their success or otherwise as slaughtermen.

It would appear certain that, by partly eliminating the human element, something short of these conditions would suffice and yet prove successful and more reliable were the force required for the stunning of animals exerted by mechanical means only. This would appear obvious for several reasons, namely :—

- I. An instrument being mechanical will operate the same way on each successive occasion ; -
- II. The power exerted for the purpose of stunning does not depend upon physical fitness ;

III. The amount of skill required to operate an instrument may be small and acquired from the outset ; and

IV. An instrument may be used with success from the outset without sacrificing any animals for practising purposes.

These observations, of course, are based upon the assumption that the instrument employed is a perfectly suitable one and capable of easy adjustment.

The Various Methods of Killing and their Relationship, Physiologically, to Bleeding and the Condition of Dressed Carcasses.

When a healthy animal is slaughtered, the method of killing, whether one or other part of the central nervous system be injured or destroyed prior to bleeding, or whether bleeding be performed in the absence of any such injury or destruction, will have an important bearing on the efficiency of bleeding and therefore the appearance of the dressed carcass.

In order to have a clear conception of the probable causes of the results obtained in the experiments to be described, it may be of advantage to briefly refer to that part of the nervous system known as the brain, which may be conveniently considered as consisting of three sections, namely :—

- I. The cerebrum (two large rounded masses of brain tissue) which is placed beneath the frontal bones or fore head, the part of the skull struck in the process of stunning cattle ;
- II. The cerebellum (two small lobes immediately behind the cerebrum) ; and
- III. The medulla, situate immediately beneath the cerebellum. It appears like an expanded portion of the spinal cord and forms the connecting link between the latter and the brain.

I. The Cerebrum. In this part of the brain are situated the centres having to do with impressions, painful or otherwise. Indeed, the seat of these centres has been aptly termed the main sensory station. For example, should an animal receive a prick, blow, cut or other form of stimulus on some part of its anatomy, an impression will instantly pass from the injured part along the nerves, through the spinal cord and medulla, and be recorded in the cerebrum, thus making the animal aware of the fact, no matter whether the impression be one of indifference, pleasure, alarm, or pain, severe or otherwise.

When an animal is slaughtered by stunning, the concussion caused by the blow of the hammer or pole-axe or by the captive-bolt penetrating the brain puts the main sensory station either temporarily or permanently out of action, thus rendering the animal unconscious. Again, bleeding by the Jewish method, or the ordinary method of

sheep sticking, is rapidly followed by unconsciousness because of interference with the regular flow of blood through the vascular system without which the brain ceases to function.

Now, it has been computed that the blood may circulate through the carotid artery at the rate of about a foot per second and that when such a vessel has been opened it may escape at a speed of from five to ten times as great. It is conceivable, therefore, that the time occupied in the onset of unconsciousness in an animal bled without previous stunning will be more or less controlled by the quickness and completeness with which the operation of severing the large blood vessels in the region of the throat is performed. For the latter reason, slaughtering by bleeding without previous stunning, whether by the Jewish or any other method, should not be permitted unless the method and instruments used are such that the vessels and adjoining tissues can be completely severed almost instantaneously. But no matter how near the state of perfection the slaughterman may have arrived in the art of cutting or sticking, the infliction of a certain amount of pain, even if only momentarily, will be inevitable from time to time where slaughtering without previous stunning is carried out.

II. The Cerebellum, so far as this subject is concerned, is not of particular interest.

III. The Medulla. The circulation of blood within the body of an animal depends, for its regularity and power, on certain mechanisms, each acting in harmony one with the other. For example, the heart, which may be regarded as the pumping station, is engaged continuously in forcing blood in one direction while, at the same time, receiving it from another. This circular distribution is a continuous one and may amount to the entire blood of the body passing through the heart of a bullock at least once in a little under a minute. In accordance with whether the heart is more, or less, active, the small blood vessels accommodate matters by contracting or dilating; thus raising or diminishing blood pressure.

The activity of the various muscles of the body and limbs assist the flow by squeezing the blood along the veins, and amongst the most important are those concerned in respiration. As the capillaries or minute vascular spaces joining the arteries and veins are somewhat larger during exercise than during rest, the kicking with a free limb by an animal during slaughter is an important aid to good bleeding. The muscles concerning respiration, particularly the diaphragm (skirt and back collop) are all important factors concerning blood circulation. As the centres controlling the mechanisms so important to life, such as respiration, circulation and the heart's action, are all lodged within the medulla it will be apparent that no matter by what method an

animal is being slaughtered, the efficiency and completeness of bleeding and the consequent appearance of the dressed carcass will more or less depend upon the extent to which, and at what stage, the medulla has been interfered with.

Killing by Stunning followed by Bleeding.

In felling an animal with a hammer, pole-axe or heavy mallet, the concussion occasioned by the impact opposite the brain results in the animal suddenly falling in an unconscious condition. Providing the concussion has been just sufficient to cause unconsciousness and nothing more, the heart beating, breathing and blood circulation may continue. Indeed, providing the animals were not bled, many in such circumstances would recover. When the vessels are cut after stunning, the animal bleeds freely and well, death taking place before the recovery of consciousness. Sometimes the slaughterman delivers the first blow with the spiked end of the pole-axe ; when he stuns the animal in the usual way, that is by using the flat side of the head of the pole-axe, he invariably follows this up by delivering several blows with the spiked end to pierce the skull. Further, it is usual to complete the felling by passing a cane or wire through the opening made towards the spinal cord, thus injuring or destroying the medulla. When this occurs the animal is immediately paralysed, less likely to struggle and easier to stick ; and if not bled, would simply die from asphyxia. By destroying the medulla after stunning, but prior to the process of bleeding, one is thus deliberately interfering with the heart's action, respiration and circulation and therefore further hampering the possibilities of perfect bleeding. These, then, are the methods pre-prevailing in the slaughter of cattle, and have been practised for ages without any question as to good, bad, or indifferent bleeding, or their effects on the condition of the dressed carcasses.

Again, when an animal is stunned by a blow with the hammer, one must not suppose that the concussion caused is confined to the cerebrum or large brain. As the different sections of the brain are in close contact one with the other, it would appear certain that a degree of concussion, proportionate to the severity of the blow and weight of the hammer, will be passed on to the medulla and surrounding structures before being finally lost.

By slaughtering an animal with a mechanical killer liberating a free bullet, the latter, after penetrating the cerebrum, often destroys the medulla in continuing its course, thus stunning and paralysing at one and the same time. When, however, the captive-bolt pistol is used for stunning, the bolt simply penetrates the skull and cerebrum, but is automatically withdrawn before the animal has had time to fall.

The possibility of some concussion being passed on to the medulla by this method also should not be overlooked.

It will be observed from what has been stated that by the use of the felling-hammer, pole-axe, or the captive-bolt pistol, stunning is effected by concussion primarily affecting the cerebrum ; and when the animal has fallen in an unconscious and relaxed state a period elapses before any attempt to cause paralysis by pithing with the cane has been made, whereas by use of the free-bullet pistol, pithing and stunning may often occur at one and the same time.

At first sight, it might appear that some difference would occur in the appearance of the carcasses of animals slaughtered by the two methods described. Providing that bleeding is carried out promptly and efficiently, after each method, it may be shown that any difference occurring physiologically is so remote that in the appearance of the dressed carcasses, there is nothing by which any one may be distinguished from any other. The latter remark particularly applies to cattle, for whilst one never meets with cases of so-called splashing in the carcasses of these animals, one does, periodically, meet with cases amongst carcasses of pigs stunned with the ordinary felling mallet as well as those stunned with the mechanical killer.

The probable causes of splashing will be referred to in the description of that condition and in connection with sheep slaughtering experiments to be described later.

Killing by Bleeding without Previous Stunning.

This is the method by which Jews slaughter cattle and sheep. Each animal, after the limbs are secured, is laid upon its back with the head extended backwards exposing the throat region.

In some parts of the country pigs are killed by sticking, the animals being secured for the purpose by suspending them in the air by means of a chain attached to a hind limb.

As one would expect, splashing in carcasses of animals killed by bleeding only is unknown.

Killing by Bleeding and Pithing, without Previous Stunning.

This is the method by which butchers have slaughtered sheep since time immemorial. The animal, after being placed on a crate with the two fore limbs and left hind limb secured together by means of a thin rope and with the upper or right hind limb free, is stuck by completely piercing the neck with a sharp pointed knife, thus severing the large blood vessels. Some slaughtermen follow up the sticking by cutting the spinal cord in the region of the medulla with the point of the knife ; others pass the finger into the aperture made by sticking

and press the medulla, thus causing immediate paralysis. As unconsciousness by this method of killing, like the Jewish method, is the immediate result of cerebral anæmia, anything which interrupts the bleeding will, as a matter of course, tend to delay the onset of unconsciousness.

Now, as it has been previously explained, injury or destruction of the medulla, by interfering with the mechanism of the heart's action respiration and circulation, tends to retard bleeding, it is probable that an injury to the medulla by pithing may, notwithstanding the concomitant interference with respiration, delay to some extent the onset of unconsciousness. As bleeding by this method of slaughter is well established before pithing takes place, the effect of the latter is so infinitesimal as to have little or no practical bearing upon the appearance of the dressed carcass. Nevertheless, as the pithing of sheep cannot be claimed to be of any great advantage to the slaughterer, it is suggested, in the interests of the animals, that in all cases where slaughter by bleeding without previous stunning is permitted, the practice of pithing should cease.

Jewish versus Ordinary Method of Sheep Killing.

From the standpoint of humane slaughtering, the difference existing between these two methods may be said to depend on the time occupied in carrying out the operation and the condition of the knives used for the purpose. For example, by the Jewish method, an extremely sharp or razor-like knife, having a blade about 14 inches long, is used to cut the skin, muscles, blood vessels, nerves, and other tissues in the throat region. This operation is performed in an almost instantaneous manner by practically one stroke, whereas by the ordinary method the slaughterman, using an ordinary sharp pointed knife, quickly pierces the neck after which he turns the blade and then withdraws it sharply, whilst at the same time completing the cutting operation. Unfortunately, in some instances, insufficient attention is paid to the condition of the knife used, and the necessity for doing the operation quickly; and when this is followed by extending the head backwards in an attempt to dislocate the neck before finally inserting the finger into the wound to make an additional attempt to pith, the further amount of pain inflicted appears unjustified and could be prevented.

Whilst not contending that, from the humane standpoint, the Jewish method equals the method of stunning before bleeding, it would appear reasonable to suggest that before the ordinary method of sheep killing can be considered equal to the Jewish method, some modification or improvement will be necessary. For example, if

only extremely well sharpened and suitable knives were used in the slaughtering of sheep and lambs by the ordinary method, and that the sticking were carried out as efficiently and quickly as the process of cutting by the Jewish method usually occurs then, and then only, would the weight of evidence be in favour of the butchers when contesting their rights to be permitted to continue slaughtering those animals without previous stunning, so long as the Jewish method is permitted.

Killing by Pithing or Injury to the Medulla, followed by Bleeding.

Although the practice is not a common one, slaughtermen have been frequently observed, when killing cattle, to deliver a blow behind the head with the spiked end of the pole-axe. When this occurs the animal suddenly falls to the ground in a paralysed condition. As the animal, after falling, may remain quite conscious, the practice is a most objectionable one, and I feel quite sure that it is only necessary for butchers to realise how unwittingly unnecessary suffering may be caused to gain their voluntary co-operation in the abolition of such a method for all time.

The Disfigurement of Dressed Carcasses.

The possibility of carcasses being deteriorated, owing to disfigurement due to the presence of the so-called splashing, as a result of killing pigs, sheep and lambs by stunning before bleeding is a trade problem that has been raised from time to time. So far as sheep and lambs are concerned, this question never came into prominence until mechanically-operated instruments were used for stunning purposes. In all the cases investigated by the author, as affecting pig, mutton and lamb carcasses, in no instance was any carcass found either unfit for food or so seriously disfigured as to materially affect its market value. In most cases it was only necessary to remove the diaphragm, the part most commonly disfigured, to render the carcass indistinguishable from other normal carcasses. In the case of one or two sheep and pig carcasses, however, not only the abdominal walls, but also the shoulder and neck muscles, singly or combined, have been found slightly disfigured with streaked hæmorrhagic areas. Fortunately, such cases are not common even amongst those that are affected. Sometimes when pigs are stunned with the felling hammer, mallet or captive-bolt pistol, the animals fall with the hind limbs extended. When this occurs there may be rupture of the blood vessels in the iliac region, thus causing blood extravasation in the muscles between the leg and loin or either side, or both. This condition, the result of an accident, has nothing to do with either splashing or general congestion.

As far back as most people can remember, cattle and pigs have always been killed, within this district, by stunning with an ordinary

falling hammer and mallet, respectively ; but during the whole of that period no complaint was ever heard of regarding splashing. Notwithstanding this, however, although splashing is practically unknown in carcasses of cattle, cases have been known to occur periodically in the carcasses of pigs slaughtered by stunning with the ordinary falling hammer or mallet ; but in mutton and lamb carcasses of animals killed by the ordinary method of bleeding without previous stunning, the condition is practically unknown.

Finally, the results of the experimental tests to be described indicate that by promptly bleeding the animal after stunning by the proper method, whether by means of the mechanically-operated instrument or otherwise, the cause of the conditions complained of may be eliminated.

Experimental Inquiry.

Whilst opinions are found to differ in various parts of the country concerning splashing, there appears to be no explanatory literature on the subject.

Being far from satisfied as to the precise cause of splashing and, in many cases, of imperfect bleeding in dressed carcasses, and knowing that some confusion or apprehension exists in the minds of many meat traders, regularly slaughtering their own stock, as to the probable trade risks involved by the use of mechanically-operated instruments ; it was felt that the subject was of such urgent importance as to demand further inquiry.

For these reasons, the slaughtering of a considerable number of pigs by various methods of stunning has been supervised, and an examination of the carcasses made. In addition, 384 experimental tests were made on sheep and lambs with a "Cash" captive-bolt pistol, the slaughtering being done by various methods.

As it was considered essential, particularly for the purpose of recording results, to be quite certain of the method of procedure in each case being carried out precisely as planned, the author deemed it advisable and therefore personally used the pistol in the slaughter of each of the 384 animals, directed and supervised the process of bleeding and subsequently made a close examination of each carcass.

In connection with the stunning of the 384 sheep and lambs no instance occurred in which the animal was not rendered unconscious instantaneously as the first act in the process of killing.

Splashing.

Splashing is the term commonly applied to a more or less disfigurement of dressed carcasses which takes the form of hæmorrhagic areas, chiefly characterised by their shape and regional distribution.

In pig, sheep and lamb carcasses it is commonly found confined to the tissues of the diaphragm, but may affect the internal surface of either the abdominal or chest walls. In pig carcasses it sometimes occurs as affecting the muscular tissues in the region of the shoulder and neck. When seen as affecting the abdominal walls, chest or neck region it often appears as dark coloured lines or streaks, giving the appearance of brush marks, or it may appear as a collection of spots varying in shape, not unlike those seen on an ordinary blotting pad. Similar hæmorrhages may be found, on cutting up the carcass, more deeply placed ; but this is much more rare.

When affecting the diaphragm, splashing may take the form of dark coloured islands or areas, some irregularly rounded, others more or less elongated. These vary in size from almost invisible dimensions up to the size of a sixpenny piece, and a quarter to half an inch in length respectively. Splashing, as described, appears to be a condition quite distinct from that ordinarily understood as imperfect bleeding. For example, just as splashing commonly occurs in carcasses extremely well bled so may carcasses be found imperfectly or badly bled and engorged with blood but with the complete absence of signs of splashing.

Again, when the condition does occur in carcasses properly and promptly bled, it is invariably so rare and of such dimensions as to have little or no bearing on either the appearance or market value of the carcass. On the other hand, when a carcass is badly affected, it will invariably be found that, irrespective of the splashing, the animal has been improperly bled, due to some error or delay of the operation, and particularly the latter. The sudden stoppage of the heart, respiratory and circulatory functions, because of injury or destruction of the medulla, has been referred to and an explanation offered that such might result from the concussion imparted by stunning, directly proportionate to the nature and extent of the impact. For example, if severe, besides the establishment of unconsciousness, the heart's action, respiration and circulation may have permanently ceased ; if less severe, there may be an effort on the part of these mechanisms to carry on only to fail after varying periods, whilst if not serious the animal would probably regain consciousness if not bled.

Bearing in mind these facts and also remembering that the capacity of the venous system is more than twice that of the arterial and that the veins, besides being less muscular, are less elastic than the arteries, it is conceivable that in accordance with the time elapsing between the stunning and the commencement of bleeding so will the degree of congestion and the presence of regional engorgement such as splashing be manifested in the carcass.

For example, when the large blood vessels are opened immediately

after stunning, the vascular and muscular pressure, and other factors already existing, are invariably sufficient to guarantee a complete and rapid flow of blood before stasis has had time to occur, regional or otherwise ; and when the bleeding has followed an injury or destruction of the medulla, such as pithing instead of stunning, the drainage might still be comparatively satisfactory with the exception that the carcass on close inspection may reveal more or less capillary congestion. Further, it matters not whether the animal has been felled by stunning or by pithing, if the period elapsing before the animal is bled be unduly prolonged, the carcass will be so congested in appearance that splashing, if present, may be entirely masked.

Again, after stunning, when the moment of bleeding, although not prompt, has not been sufficiently delayed to cause congestion, incompleteness of drainage may result in regional venous engorgement manifested by the so-called splashing ; and when it takes place after a similar period following some injury to the medulla instead of stunning, splashing, if present, will invariably be accompanied by more or less general congestion.

Cattle.

During October, 1925, for the purpose of a demonstration on various methods of slaughtering carried out within the City, four fat heifers, which were all about the same size, weight, age and breed and had been kept under identical conditions, were slaughtered by the following methods, namely :—

1. Ordinary method of stunning with felling hammer ;
2. Shooting by means of the "Greener Humane Killer" ;
3. Stunning by using a captive-bolt pistol ; and
4. The Jewish method.

After the carcasses had been completely dressed they were sectioned into sides and arranged in two rows suspended by overhead rails. On making a superficial inspection nothing was observed to distinguish them, one from the other. They appeared well bled and in first class market condition. On making a very close and prolonged inspection an attempt was made to place them in order of merit as to apparent perfection of bleeding, brightness and appearance generally. It should be noted, however, that both external and internal surfaces of the sides presented slight differences between the two sides of the same carcass. Moreover, slight differences were distinguishable between the fore and hind quarters of the same sides, besides between different parts of the same quarter. This applied equally in every case, and it may be added that the distinction between any two carcasses appeared in no case much greater than could be observed in one or two instances between two quarters of the same carcass. The slight differences

in appearance referred to are of little importance and usually pass unobserved.

The carcasses were eventually placed in the following order of merit :—

- | | | |
|-------|-----|--|
| 1st. | - | Slaughtered by the Jewish method. |
| 2nd | - | do. do. Ordinary felling hammer. |
| Equal | do. | do. Captive-bolt pistol and "Greener Humane Killer." |

Six days later, that is to say, on 12th October, 1925, the premises were again visited for the purpose of further inspecting the carcasses after sectioning the sides into quarters. In the meantime the beef had been kept hanging within the cooling chambers at the abattoir. For the purpose of inspection, one fore-quarter from each of the four carcasses was placed upon a table, the four quarters being arranged side by side so as to expose the newly cut surface of the first cut of the chine in each case. As in all the previous cases, when proceeding to place them in order of merit, it was not known by which method the animal from which any particular quarter was derived had been killed. After spending a considerable amount of time in attempting to place them in order as to merit, this was found practically impossible. Eventually one quarter was chosen as the best in appearance, the remaining three being considered as about equal. Whilst it was found that the quarter selected was from the heifer killed by means of the captive-bolt pistol, it should be noted that each of the four quarters appeared in faultless condition.

These demonstrations did little more than confirm the experience gained during a long period within the City. For example, during the past 22 years, approximately 40,000 prime bullocks and heifers have been slaughtered in one establishment alone by the use of mechanically-operated instruments. With the exception of a few hundred which were slaughtered during the past two or three years with a captive-bolt pistol, all were slaughtered with the "Greener Killer." In other slaughterhouses within the City several hundred cattle have been slaughtered during the past two years with a captive-bolt pistol.

It may be noted that the carcasses of these animals have been regularly inspected and at no time has anything been detected to distinguish them from carcasses of animals slaughtered in other establishments by the ordinary method. Moreover, no complaint has been received as to imperfect bleeding or the method of stunning.

Although it appears probable that carcasses of beef of animals slaughtered by the Jewish method may be amongst those most perfectly drained of blood, in actual practice, and all other things being equal, the method of killing—assuming each is properly carried out—

would appear to have little or no bearing on the general appearance of carcasses of freshly killed animals or the brightness, firmness or general commercial qualities of the meat when cut. In other words, if of a hundred bullocks or heifers an equal number were to be slaughtered by the four methods employed in the demonstrations, and, further, if the carcasses of these animals were cut into quarters or small joints and submitted to inspection by a Committee of Experts, it is certain that the latter would not find it possible to distinguish either the quarters or the joints by reason of a knowledge of the different methods by which the animals had been slaughtered.

Pigs.

With the exception of one carcass, which was examined within a wholesale meat shop, all were examined in one establishment where the animals were slaughtered under the author's supervision. A total of 315 carcasses were examined.

At the outset it should be noted that the length of time allowed to elapse in each case between the moment of stunning and commencement of bleeding was not taken, but this subject will be found dealt with under the heading of sheep slaughtering.

Number Slaughtered	Method of Stunning	Condition of Carcasses.
41 (including 5 sows)	"Cash" Captive- bolt pistol	Normal.
25	Temple-Cox Captive- bolt pistol	Two slightly splashed (hæmorrhagic spots on diaphragm). Remainder normal.
5 (all sows)	"Greener Killer" (free bullet)	Normal.
244	Ordinary Felling Hammer	Three were very slightly splashed ; small hæmorrhagic areas being found in the diaphragmatic muscle. Six were slightly splashed ; similar to above. Five were more extensively marked on the diaphragm, and in several of these the peritoneal surface exhibited streaked areas. In one, the diaphragm exhibited hæmorrhagic areas measuring up to 1" in length by $\frac{1}{2}$ " in breadth. The remaining 229 were normal.

It will be observed, according to the table submitted, that of the

pigs stunned with the ordinary felling hammer (the traditional method within the City) the percentage of carcasses found splashed was twice as great as that from pigs stunned with the captive-bolt pistol.

It should be noted that in those cases where only the diaphragm was discoloured, removal of the latter left the carcass in an apparently perfect condition. Apart from the splashing, the carcasses were all in splendid condition. When pigs are stunned with the felling hammer or pole-axe a considerable area of bruising and damage commonly occurs in the skull owing to the irregular breaking down of the bony tissues, but when the captive-bolt pistol is used, owing to the fact that only a clean puncture is the result, the dressed head is not only much better in appearance but of greater market value.

Sheep and Lambs.—Experiments on various Methods of Stunning and Bleeding.

These experiments were carried out between 31st October, 1928, and 16th January, 1929, a total of 384 animals being used for the purpose, comprising first class quality lambs and hogs from 7 to 10 months old, fully developed gimmers and wethers and large ewes.

The stunning was done with a "Cash" captive-bolt pistol by the following methods, namely:—

1. (a) By shooting through the cerebrum ;
 (b) " " " " " and directing bolt towards
 medulla ; and
 (c) By shooting through the medulla.
- After stunning by each of the above methods, bleeding in each case was performed as quickly as possible.
2. By shooting through the cerebrum, bleeding being performed :—
 (a) After an interval of one minute ;
 (b) " " " " two minutes ; and
 (c) " " " " three minutes.
3. By shooting through the medulla, bleeding being performed :—
 (a) After an interval of one minute ;
 (b) " " " " two minutes ; and
 (c) " " " " three minutes.

- 1 (a). Stunning by shooting perpendicularly through the cerebrum, bleeding being performed immediately afterwards.

A total of 330 were killed by this method which, when killing sheep by stunning, should be regarded as the correct one. In many cases the bleeding or sticking was followed by the common practice of breaking the neck and pithing. Although the latter procedure was quite unnecessary and of no

advantage, it did not appear to make any difference to the efficiency of bleeding or the appearance of the carcasses. The carcasses were examined immediately after being dressed and again after setting, and all were found well bled and in splendid condition. In eight cases hæmorrhagic spots were discovered as affecting the diaphragm, and in seven of these they were scarcely discernable owing to their minuteness, and could not be detected except by stretching the diaphragmatic muscular tissues and examining in an exceptionally good light. In the remaining one, the minute hæmorrhagic spots could be more easily detected, but even in this case they were not observed by the slaughterman. This was only natural, as there was nothing in the appearance of the diaphragm to attract attention by an ordinary survey of the carcass. The eight carcasses referred to, notwithstanding the description of the diaphragm given as a result of the minute and critical examination in each case, were all in beautiful condition.

Number of Carcasses		Method of Stunning	Condition of Carcasses	
	6	Shooting into the cerebrum, directing the bolt towards the medulla and bleeding immediately.	Normal.	
(b)	{			
		12	Shooting into the medulla and bleeding immediately.	Normal.
(c)	{			
2.				
	{	6	Shooting into the cerebrum and bleeding after an interval of one minute.	3 Normal. 1 Diaphragm presented hæmorrhagic spots, one being $\frac{1}{8}$ " long. 2 Diaphragm in each case presented two hæmorrhagic spots.
(a)		{		
	6		After an interval of two minutes.	3 Normal. 1 Diaphragm, one hæmorrhagic spot $\frac{1}{8}$ " long. 1 Diaphragm, three hæmorrhagic spots $\frac{1}{8}$ " long. 1 Diaphragm, seven hæmorrhagic spots, three being $\frac{1}{8}$ " in length.
(b)	{			

Number of	Carcasses Method of Stunning	Condition of Carcasses
(c)	6 After an interval of three minutes.	<p>3 Normal.</p> <p>1 Diaphragm presented fourteen hæmorrhagic areas, four being about size of a shilling and three about the size of a six-penny piece.</p> <p>1 Diaphragm presented eleven hæmorrhagic areas, four being as large as a threepenny piece.</p> <p>1 Diaphragm heavily marked with hæmorrhagic areas varying in size from a threepenny piece to that of a shilling.</p> <p>Left peritoneum presented several hæmorrhagic oblong areas $\frac{3}{4}$" \times $\frac{1}{4}$"; also several areas about $\frac{1}{8}$" square.</p> <p>Right peritoneum, ten hæmorrhagic areas about $\frac{1}{4}$" square and one measuring $\frac{3}{4}$" \times $\frac{1}{8}$".</p> <p>Left pleura, hæmorrhagic areas between the 3rd and 9th ribs, ranging in size from $\frac{3}{4}$" to 1" long \times $\frac{1}{4}$" wide.</p> <p>Right pleura, twelve hæmorrhagic areas, one 1" \times $\frac{1}{4}$"; one the size of a threepenny piece, and several $\frac{1}{8}$" \times 1/16th inch square.</p>
3.	6 Shooting into the medulla, bleeding being performed after an interval of one minute.	<p>3 Normal.</p> <p>1 Three hæmorrhagic spots in diaphragm.</p> <p>1 Four hæmorrhage spots in diaphragm.</p> <p>1 One hæmorrhage in diaphragm more pronounced.</p>
(b)	6 After an interval of two minutes.	Normal.
(c)	6 After an interval of three minutes.	3 No splashing but distinct evidence of imperfect bleeding.

Number of Carcasses		Method of Stunning	Condition of Carcasses
(c)	6	After an interval of three minutes	1 Diaphragm slightly splashed with hæmorrhagic spots, one being $\frac{1}{4}$ " long.
			1 Kidney fat showed evidence of imperfect bleeding.
			1 Diaphragm presented three hæmorrhagic spots.

It will be observed, according to the results of these experiments, that when sheep and lambs are bled immediately after stunning, the carcasses will be found well bled and in first class condition, whereas when intervals varying from one to three minutes are allowed to elapse after stunning before bleeding takes place, at least fifty per cent. of them may be found more or less extensively splashed; and when the killing has been imperfectly performed by destruction of the medulla instead of the cerebrum, the splashing may be accompanied by more or less congestion or imperfect bleeding.

As distinguished from cattle and pig killing, the question of improper securing or the inability to stun with the first blow or shot does not arise so far as sheep and lambs are concerned for the reason that the traditional method of killing these animals is—like the Jewish method—one of bleeding only.

In a number of cases the period elapsing between the commencement of sticking by the ordinary method of sheep killing and the cessation of consciousness has been timed and found to vary between 34 and 38 seconds, the differences in this respect apparently depending upon the more or less efficiency and quickness with which the operation is performed. By the Jewish method the operation of severing the blood vessels, etc., usually occupies less time than by the ordinary method, but when improperly performed one may find the time elapsing between the commencement of bleeding and the cessation of consciousness to be twice as great as that by the ordinary method properly performed.

Providing that in each case the operation is instantly and efficiently performed with extremely sharp knives, there would appear to be little difference between the Jewish and ordinary methods of sheep killing.

Summary Conclusions.

1. The most humane method of slaughtering is that which renders the animal unconscious immediately.
2. The use of suitable mechanically-operated instruments is preferable to the pole-axe or hammer for the stunning of cattle and pigs.
3. Killing by injury of the medulla (pithing) which paralyses only,

before bleeding the animal, instead of stunning by direct concussion of the cerebrum, is an objectionable practice and should be prohibited.

4. The stunning of cattle and pigs with the ordinary felling hammer, mallet or pole-axe is not on a comparable basis with the ordinary or traditional method of sheep killing.
5. So far as efficient bleeding and appearance of the carcasses are concerned, it makes no difference whether the animal is stunned with a mechanically-operated instrument, mallet, felling hammer, or pole-axe.
6. When animals are properly bled immediately after stunning the carcasses are invariably found in perfect condition.
7. Undue delay in proceeding to bleed sheep or pigs after stunning may result in the carcasses being splashed, congested, or both.

TOWN HALL,

NEWCASTLE-UPON-TYNE.

30th March, 1929.

THE COUNCIL OF JUSTICE TO ANIMALS AND HUMANE SLAUGHTER ASSOCIATION.*

The Result of a Visit to Poland.

By Miss VIOLET WOOD, Secretary.

IN June, 1927, the Secretary of the Council of Justice went to Warsaw, having been invited by several Poles to visit that city and try to introduce humane killing into the Abattoir. As an account of that visit has already been written, it is unnecessary to repeat what occurred during that month. A Society was founded under the title of the Polish League of Friends to Animals, and as most of the working horses were unfit and suffering from sores, mange, lameness, blindness or with their hind legs dropping as they ran, it was decided that the most practical method of relieving their pain would be a Veterinary Dispensary. As no Society in Poland may receive money until it is legalized by the Government, which takes some time, the Council of Justice agreed to pay all expenses it would incur for three months, by which time the League hoped to be in a position to take the responsibility upon itself. This Polish League has not yet been in existence for two years, but has lately issued its Report for the year 1928, and the following is a brief account of its activities.

* **CHIEF OBJECT** :—To promote Humane Methods in the Slaughtering of Animals for Food, and the Painless Killing of Horses, Dogs, Cats and other Animals.

It asked the clergy to preach sermons on the subject of Justice to Animals, which they consented to do. During one year 1,952 letters were written, and 30,000 pamphlets distributed. Articles were published in various papers, and ambulances for injured horses placed upon the streets.

It bought 13 old and totally unfit horses that were working, and had them shot, and opened a branch at Zychlin, a town two hours' journey from Warsaw, with a membership of 100 persons. The number of patients received at the Dispensary during the year was as follows :—Horses 448, Dogs 1,992, Cats 236, other animals 98, making a total of 2,774.

The Inspectors of the League, with one exception, are unpaid, and the description of their work is given in the words of the League's Report.

Regional Inspectors.

The Council of Regional Inspectors was organized by the League in January, 1928. The duties of inspectors were set forth in specially printed "Instructions." Their main functions are: inspection of stables, slaughter-houses, market places and the like, also inspection of animals in the streets of Warsaw and the suburbs. Each inspector receives a sort of passport duly certified by the Police Authorities, and containing a note to the effect that policemen are bound to give the inspector every assistance possible in matters connected with the protection of animals. It was also understood that the inspectors are to have free access to all places and institutions where animals are being kept.

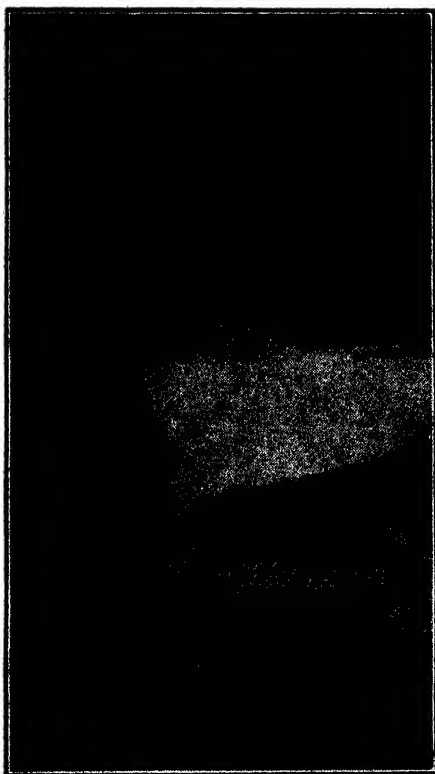
The activity of inspectors on the Warsaw territory is often very difficult and dangerous. There are many wild elements here after the War, and especially the class of professional drivers is known by its cruelty and barbarian instincts. It was essential, therefore, to provide the inspectors with Brownings and Police whistles.

The city of Warsaw is divided into 27 police districts, and each inspector was assigned one of these districts as his particular field of operation. Within a few days after his appointment the inspector had to call on the chief of the police in his district, the so-called "Commis-sar," from whom he obtained a list of stables and addresses of cabmen and drivers. Close co-operation is established between the Commissar and the Inspector. The latter can always have a few policemen at his disposal to accompany him to particular places.

The inspectors received printed forms of protocols to be directed to the court or to police authorities in all cases where cruelty to animals was noted. These forms were prepared as per pattern furnished by the local authorities, and the protocols are given careful and prompt

attention. In order to illustrate the activity of inspectors we are quoting below a few cases, each of which should be handled in a different way, for example :—

A lame or wounded horse is noticed in the street :—The inspector has to stop the cart and to direct the horse to the nearest police station to have it "sealed." (A string is put round the horse's neck the ends of which are passed through a piece of cardboard and fixed by a seal so as to be sure that the animal will not be used for work until the owner produces a doctor's certificate that the animal is fit. The seal is then taken off by the police.)



One of the 13 Horses rescued from working in misery by the Polish League.

If the horse is not seriously injured :—The inspector should direct the animal to our dispensary. He produces a small book from his pocket containing blank forms with the dispensary address, and fills in the name of the driver, description of the horse and other details. This sheet is given next to the driver who is instructed to take the horse to the dispensary. The driver's address is noted separately by the inspector for sake of control.

If a horse is overloaded :—The inspector stops the cart and draws a protocol to be directed to the police authorities. He then orders the driver to stop in the street and secure another horse, or else directs the cart to the nearest

police station where part of the load is discharged. The owner of the horse will be fined for overloading the animal.

If the driver is cruelly beating a horse :—The inspector stops him, secures the driver's name and address, and directs a protocol to the court where the guilty will be punished.

In all other cases of cruelty to animals :—Protocols are directed to the court.

Statistics for 1928 show the results of our inspectors' activity as follows :—

Sealed (horses)	..	..	156	Directed to dispensary		
				(horses)	..	.. 390
Protocols drawn	..	..	361	Stables inspected	..	657
Court decisions passed	..		85	Animals inspected	..	2,819

In addition to the above, inspections were made at the slaughter-house, the circus, in market places, etc., and reports on such inspections were published in the Warsaw Press.

The Council of Justice to Animals is sending out this brief account of the magnificent work of the Polish League in the hope that it may be an encouragement to other struggling Societies, and that the excellent idea of "sealing" horses may be adopted in this country as well as in all others.

They trust, too, that it may lead many to join their Foreign Legion and make the work they helped to start in Poland possible, not only in all towns of Europe where it is necessary, but in all countries of the world.

HIGH PROTEIN DIET AND RENAL DISTURBANCE IN YOUNG SHEEP.

By JAMES STEWART, M.A., B.Sc., Ph.D.

Department of Animal Pathology, Cambridge University.

OF late years in the eastern counties of England there has been repeatedly observed a disease amongst young lambs which, on account of one of its principal features, has been called, for want of a better name, "Pulpy Kidney Disease."

Lambs which have shown no previous symptoms, die suddenly. On *post-mortem* examination the principal, and usually only, pathological feature is a peculiar disorganisation of the substance of one or both kidneys which has become resolved into a pulpy mass. Lambs which seem to be most susceptible to this condition are usually about twelve to fifteen weeks of age, at which time in many instances they have been placed on an artificial food ration or at least had their natural pasture supplemented by artificial food in the form of concentrates such as linseed cake and cottonseed cake. An interesting feature is that lambs usually affected appear to be those in the best condition and most forward for their age. On *post-mortem* examination of the carcasses of lambs which die of this disease, there

is usually no evidence that the condition is of bacterial origin. In a number of examinations carried out by the Department of Animal Pathology, Cambridge, it has not been found possible so far to isolate any organism which was capable of reproducing the disease, but further work on this problem is still being carried on. From the nature of the ration fed to most of the sheep which succumb, and from the forward condition of the animals, it has come to be generally accepted that the disease is in all likelihood due to an excessive protein consumption. This view is supported by the observation that when the artificial ration is discontinued the deaths stop immediately. Professor T. B. Wood (1) in discussing the feeding of sheep, says, "There is an almost universal tendency amongst farmers to overdo the protein in the ration of fattening animals, especially sheep. It may well be that this excessive consumption of protein is the cause of many of the sudden deaths amongst sheep folded on roots in the winter. The extra work thrown on the kidneys by excessive protein consumption may cause a serious derangement which results in sudden death."

The disease is not confined to England, as is shown by some recent publications in various journals of the Agricultural Colleges of the Dominions. Gill (2) described an almost identical disease in New Zealand but in slightly younger lambs. He says "For many years throughout New Zealand, where the fat lamb industry is carried on, sudden deaths have occurred amongst lambs at the age of three or four weeks. *Post-mortem* examination of the carcasses has shown a pulpy condition of the kidneys, and an excessive amount of fluid of the heart sac. The lambs which died were always exceptionally forward for their age, and after much careful work it was concluded that the trouble was of dietetic origin." Dakin (3) reporting on a disease known as "Beverley Disease" in Western Australia describes it as follows, "Unconsciousness and quiet death. Carcass is invariably that of well nourished lamb. *Post-mortem* appearance mainly negative as far as pathological degeneration of the organs except for marked lesions in the kidneys which are quite soft and sometimes almost fluid." Though he himself believes that the disease is of bacterial origin associating it with Braxy, he concludes thus, "No organism could be discovered which could be regarded as the cause of the disease and the condition of the feed and the treatment of the sheep in regard to the feed seemed to be associated factors of great importance."

Two typical cases of this disease were sent to the Department of Animal Pathology, Cambridge, for diagnosis during the late Spring of 1928, and are described below together with an account of the ration which had been fed to the sheep.

Case 1.

A farmer, near Cambridge, in May, 1928, lost twenty twelve-week-old lambs within seven days, all of which died suddenly. They appeared to be well and looking normal at night, but were found dead in the morning. One of the animals sent for examination showed as the only pathological change a typical pulpy kidney which, as far as could be determined, was quite sterile. The sheep had been folded on sainfoin and were receiving $\frac{3}{4}$ lb. daily per head, of a mixture of equal parts of crushed beans, flaked maize and linseed cake. Of course, it was more than probable that several of the lambs received more than their share of the feed. It had been observed in former cases that it was usually those animals, which might be called the bullies of the flock, in that they liked to take the most, and drove the other animals away from the feeding troughs till they themselves were satisfied, which were the first to succumb.

Case 2.

A lamb from Cambridge University Farm which had been on a feeding experiment appeared well on the previous evening but died during the night. On *post-mortem* examination, it was found to have a pulpy kidney, this being the best specimen of a pulpy kidney that has been obtained. The ration consisted of 3 parts linseed cake, 1 part peas, 1 part oats, 1 part Kositos (flaked maize), one half to three quarters of a pound being fed to each lamb. Though a large number were being fed on this ration only the one animal died.

The following are the microscopical findings on a section of the kidney in Case 2. The cortex showed a uniform necrosis affecting both the glomeruli and the collecting tubules. In some areas the general outline of these structures could still be observed, but in others the cells had been entirely broken down, leaving an undifferentiated tissue. The necrosis extended as far as the boundary layer. In the medulla there was well marked congestion of the vessels. Here, many of the tubular cells were apparently normal in appearance, or showed but slight evidence of degeneration. Some, however, were markedly abnormal, showing all gradations from slightly swollen appearance to vacuolisation of the cytoplasm, accompanied by loss of the cell wall even to complete necrosis.

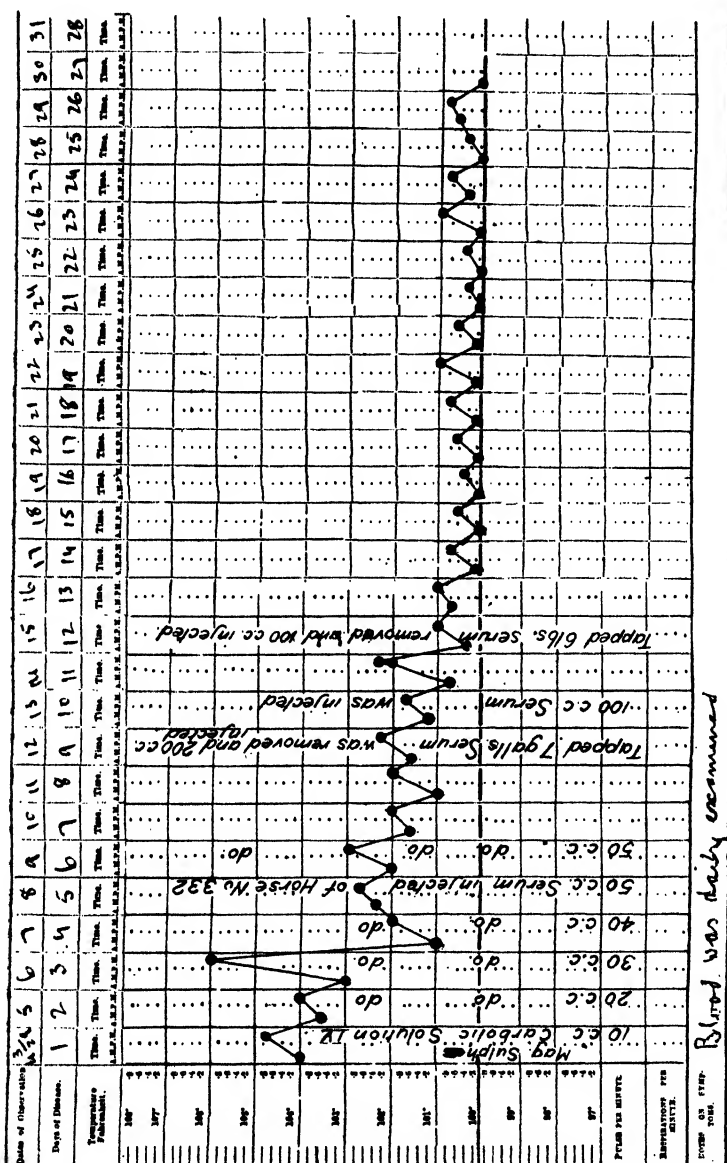
It has been suggested by Owen-Johnston (4) that "pulpy kidney disease" is due to oxalate poisoning. The evidence is, however, of a very unconvincing nature, and the fact that attempts made to set up a similar condition by dosing sheep with oxalate were more or less successful in that a necrosis of some of the cells of the tubules was demonstrated histologically in the experimental animals, must not,

be regarded too seriously since there is no evidence to support the hypothesis that oxalate could be obtained in sufficiently large quantities under natural conditions. Certainly in this country at least, oxalate cannot be regarded as the cause of the disease, since sorrel, the principal source of oxalate in pasture, has never been observed in the grassland or folds of sheep which have died of pulpy kidney. In considering the rations fed to the animals in Cases 1 and 2 cited, it will be observed that a common feature of the ration is the high protein content, and this encourages the belief that the cause of the disease might be excessive protein consumption.

During recent years numerous investigations have been pursued especially in America with a view to determining the effect of diets containing a high proportion of protein upon the structure and functioning of the kidneys. Although it is generally acknowledged that the ingestion of excessive amounts of protein is harmful in the case of pre-existing disease, there is considerable difference of opinion regarding the part played by such diets in the causation of disease.

Newburgh (5) using rabbits fed upon a diet consisting of a mixture of egg-white, casein, and soya bean, observed pathological changes in the kidneys which he described as a congestion. He states that definite lesions of the tubules were also present. Employing a diet consisting of egg-white alone, he produced a nephritis in a very short space of time. With a diet containing 87% casein, the renal lesions were produced in a remarkably short time and were of a very definite character. When, however, the casein was reduced to less than 33% of the total diet, no changes were found. In a later communication Newburgh and Clarkson (6) state that by giving a ration consisting of lean dried meat and some green food they again produced a nephritis accompanied by arterio sclerotic changes. An interesting feature of this work, in view of the results obtained by the writer in the experiments about to be described, was the change produced in the reaction of the urine of the rabbits under experiment. While the urine of some gave an acid reaction, that of others was alkaline. It was found, however, that the reaction of the urine had no effect upon the existence of the nephritis since renal lesions were observed in both cases. The general conclusion of the writers was "That an acid urine *per se* did not produce nephritis in the rabbit, but that it might lead to some albuminuria." Frandsen (7) studying the effects produced by inorganic salts and nitrogen on renal lesions in rabbits induced by potassium bichromate found that the animals became uraemic when fed on a diet which was very rich in nitrogen. Polvogt, McCollum and Simmonds (8) feeding rats on a diet containing 31% to 45% protein for periods of from 100-480 days, found that during these periods the normal rate of

growth was maintained, but that after a time the rats developed a chronic nephritis. Pathological and clinical evidence produced to

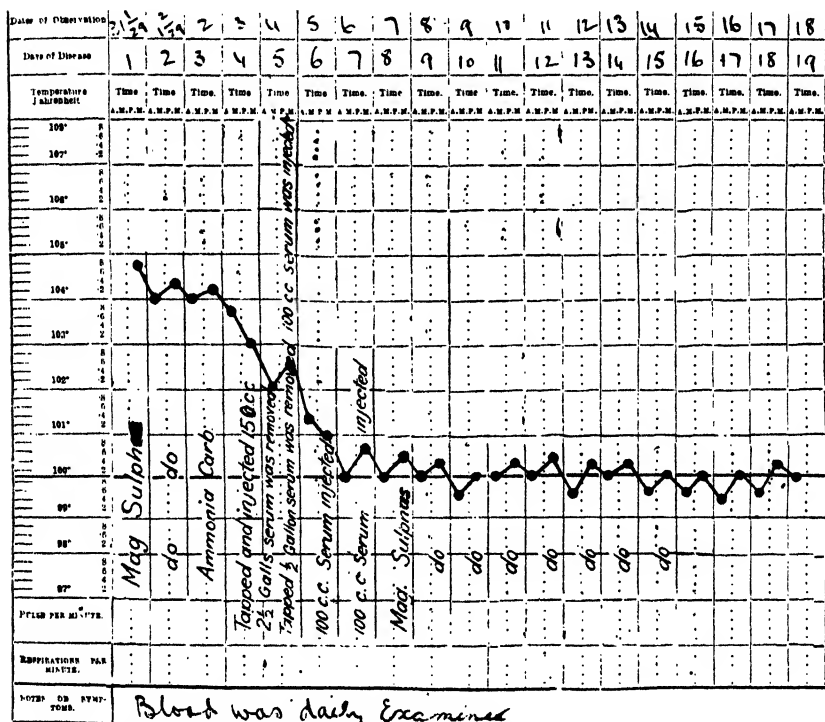


support this condition was, however, comparatively meagre, and the results are not in agreement with those of other workers who used rats as their experimental animals. Jackson and Riggs (9) found that

they were unable to produce any recognisable nephritis by feeding rats on diets containing a very high proportion of protein over a period of from 10—20 months (more than one third of the animal's lifetime). They recorded, however, a slight hypertrophy of the kidneys and also an albuminuria during the period of the experiments. Osborne and Mendel (10) fed rats on a diet containing 87.5% protein. They observed a diuresis during the period of the experiment, and on *post-mortem* examination found only an hypertrophy of the kidneys. The average weight of these organs was almost twice that of the kidneys of the control animals, and their size was about one third greater. Microscopical examination failed to disclose any changes of an inflammatory or degenerative nature. In discussing this observation they say "In this respect our findings seem to be at variance with those recently reported by Polvogt, McCollum and Simmonds, who have described serious lesions of the kidneys of rats subsisting on diets which, though termed 'excessive' in protein, contained a considerably lower content than the rations in our present experiment." In a later paper Osborne, Mendel, Park and Winternitz (11) confirmed their previous work, and came to the conclusion that hypertrophy of the kidneys is a characteristic feature in animals fed on a diet in which the proportion of protein exceeds about one third of the ration. In discussing the histology of the specimens they came to the conclusion that the changes were physiological and not pathological, since only two of their experimental rats showed renal lesions, while three of the control animals were similarly affected. They also observed a slight albuminuria both in the experimental and in the control animals, and came to the conclusion that albuminuria is quite a normal characteristic of rats. Reader and Drummond (12) confirmed Osborne and Mendel's work, finding that there was no renal damage, though a definite hypertrophy of the kidneys was present in rats fed on a diet consisting of 50% to 90% cod liver oil, yeast, and lemon juice. Maclean, Smith and Urquhart (13) using rabbits as experimental animals found that there was no evidence that a high protein diet had any deleterious effect on the kidneys of that animal. They observed, however, that if green food is withheld from the diet, nephritis results, no matter what the protein content of the ration may be. Addis, MacKay and MacKay (14), working with rats, found that feeding them on a high protein diet produced no deleterious structural effects on the kidneys.

From the foregoing experiments it appears to be evident that whilst diets containing a high proportion of protein appear to produce definite pathological changes in the kidneys of rabbits, such changes are not observed in rats under similar conditions. In seeking some explanation of this difference it should be remembered that the animals

belong to two widely different classes,⁴ and it may well be that the rabbit unaccustomed to such high protein rations is more liable to be adversely affected than is the rat, which from its natural proclivities is more accustomed to the ingestion of foods containing a considerable proportion of protein. The results obtained by these workers, therefore, tend to show that herbivorous animals such as sheep would appear to be liable to adverse effects from high protein diets, and in studying the aetiology of "pulpy kidney disease," the following experiments



were therefore designed in order to determine what pathological changes, if any, were produced in the organs of the sheep under these conditions.

Method of Conducting the Experiments.

The experiments were divided into two groups. In the first, young lambs were fed on high protein diets and changes in their metabolism were recorded by means of nitrogen balances, and in some cases by growth curves. The second group consisted of a number of feeding experiments in which batches of young lambs were kept in the open field, the food being regulated and the effects of high protein feeding on such animals living under practically normal conditions were noted as accurately as possible.

Metabolic Experiments.

The lambs were placed in metabolism cages similar to those described by Wood and Woodman (15) in their digestibility trials, and a harness of the Halnan type was used. The metabolism cages were of the Lehmann model modified in order to render them suitable for the harness used in the experiment. The harness consisted essentially of a rubber canvas sheet fixed by suitable body straps and belts to the hindquarters of the sheep. The lower end of the sheet was weighted and could hang freely over the end of the floor of the cage, the weight keeping the sheet taut whether the sheep was in a standing or recumbent position. The solid excreta were thus directed into a receptacle at the rear of the cage. The floor was perforated with small holes and two parallel metal guides were fixed to the under part of the two sides of this portion. These were so inclined as to run to the centre where a small funnel shaped device led into the neck of a suitable container. In this way the urine was drained through the holes of the perforated portion of the cage floor and was caught in the container. By these means the faeces and the urine could be collected separately.

The cages were of such a size and design as to allow the sheep perfect freedom of movement in lying down and standing up. The food and water troughs attached to the cage were shaped so that while the animal had free access to them, it was unable to scatter much of the food over the floor whilst eating. All animals were allowed some time to get accustomed to the cage and to their new ration before records were kept, or the experiment proper was considered to have started.

The food of the ration was weighed out each morning from the bulk and, in the case of grass, the composition of which was varying daily, the methods described by Woodman, Blunt and Stewart (16) in their pasture digestibility work, were employed. The dry matter was estimated daily, and a composite three-day sample of the grass was analysed every three days.

Each morning, the amount of faeces was weighed and the volume of urine measured. An amount corresponding to one fifth of the daily faeces and one tenth of the daily urine was kept in cold storage and a composite sample made up every three days, which was then analysed. The food, as stated, was weighed out every morning and the residue which was gathered every three days was measured and analysed. In this way a very accurate three-day nitrogen balance was maintained, so that a careful record of the protein metabolism (as far as balance work can show) was made. In addition a daily sample of urine was obtained and examined for the presence of albumin, sugar, and other abnormal constituents, in order that any indication of gross changes in the kidneys might be immediately recognised. The procedure

adopted to ensure an increasing protein content was as follows: The ration usually consisted of concentrates, hay and mangolds, and as the experiment proceeded, the chief concentrate was increased at the expense of the hay or the mangolds. In the first experiment the ration consisted of cottonseed cake, barley meal, hay and mangolds. As the experiment proceeded, the barley meal and hay were gradually reduced, whilst the cottonseed cake was increased in like amount. The quantity of protein consumed was thus increased gradually. In the first two experiments the sheep started with a very low protein intake which was steadily increased. In the other three experiments the protein intake was very high, even at the commencement, and was increased still further. This was designed to demonstrate if a sudden change to a high protein diet would produce a greater effect than the more gradual change. In order that the sheep should not get unduly wearied by cage conditions, they were allowed periodic rests of three days at convenient intervals in a large pen, but were fed on the same ration as was given during the experimental period.

Table I.

Table showing period of experiment, initial and maximum amount of protein ingested, age and weight of sheep.

No. of Sheep.	Age at Start.	Initial daily amount of protein intake.	Maximum daily amount of protein intake.
Sheep I	10 months	64 grams	186 grams
Sheep II	10 "	139 "	142 "
Sheep III	4 "	171 "	395 "
Sheep IV	5 "	130 "	360 "
Sheep V	15 weeks	243 "	290 "
Sheep VI	7 "	140 "	400 "

No. of Sheep.	Initial Weight.	Final Weight.	Period of Experiments.
Sheep I	Not weighed.	Not weighed.	11 weeks.
Sheep II	Not weighed.	Not weighed.	8 "
Sheep III	8 stone 10 lbs.	9 stone 2½ lbs.	17 "
Sheep IV	8 "	10 " 8 "	34 "
Sheep V	6 " 7 "	6 " 9 "	13 "
Sheep VI	3 " 2 "	3 " 5 "	9 "

It will be observed from Table I that there was considerable variation both in the age and weight of the sheep and in the maximum amount of protein consumed. Even the lowest maximum amount of protein employed (142 gms.) is, however, considerably in excess of the amount usually consumed by a 10 months old lamb, i.e. 70 to 80 gms. of protein per day. When it is taken into account that amounts as great as 390 and 360 gms. of protein were consumed by Sheep III and Sheep IV, which is well over four times the normal quantity, and that in the case of Sheep VI which weighed only 3 stone 5 lbs., the daily intake of protein was 400 gms., it is interesting to observe the singular uniformity of the results as shown by the account of the macroscopical and microscopical findings given below. The diets employed were all of a usual nature as regards their composition except in the case of Sheep VI, which, in order to increase its protein consumption to an excessive extent, was given pure casein in addition to its usual ration. The diets of Sheep I and Sheep II were composed of mangolds, hay, barley meal and decorticated cottonseed cake; the barley meal being gradually eliminated and extra cottonseed cake substituted. The diet of Sheep III and IV consisted of pasture grass, barley meal and linseed cake. In the case of Sheep III and IV both the pasture grass and the barley meal were gradually eliminated until the ration consisted entirely of linseed cake, and on this extraordinary ration Sheep III existed for one month and Sheep IV for over six months. Sheep V had a ration composed of chaff, sugar beet pulp and linseed cake, which after two months was changed to one of entirely linseed cake, which Sheep V ate avidly for over one month. The ration of Sheep VI as already stated, was of a more unusual order, 300 gms. of casein being added daily to a feed consisting of chaff, oats and sugar beet pulp.

The daily clinical examination of the urine of the experimental animals showed little abnormality. Sheep II developed an hæmoglobinuria accompanied by albuminuria, and was therefore killed. In the case of Sheep IV sugar was found in the urine on two occasions during a period of nine months. On each occasion the presence of sugar coincided with a large output of albumin. The most interesting feature of the clinical analysis of the urine was found to be a periodic albuminuria. This occurred in the case of all the sheep under experiment and could not be correlated with any fluctuation in either protein consumption or excretion. The writer has since shown (17) that albumin is a normal constituent of sheep's urine.

Since the clinical analysis of the urine showed no great abnormality the animals were killed at stated intervals, and a thorough *post-mortem* examination made. The results of the *post-mortem* examinations and of the microscopical findings are detailed below.

Post-Mortem Examination of Sheep on High Protein Diet.

Macroscopic examination of the organs of the sheep showed little or no evidence of disease. In the case of Sheep I and Sheep II which had been under experiment the shortest period of time, namely, eleven and eight weeks respectively, the liver appeared to be slightly firmer and paler than normal. Lobulation was also a little more pronounced. There was no evidence of any fatty change or any degree of fibrosis. The boundary layer of the kidneys was slightly congested. On *microscopical* examination the livers of Sheep I and Sheep II showed traces of cirrhosis and the liver cells themselves appeared to be slightly damaged—their protoplasm straining rather less deeply than normal. The kidneys, however, showed very little alteration. The glomerular tufts appeared to be quite normal, but the epithelium of the convoluted tubules showed evidence of early degeneration. The outlines of the individual cells appeared indistinct, and their protoplasm was less dense and more granular than usual. The nuclei, however, stained quite well.

Sheep IV and Sheep V showed even less change than the above. The liver appeared quite normal, and the kidneys on *macroscopic* examination showed no evidence of any inflammatory or degenerative change. On *microscopical* examination the same change was observed in the epithelium of convoluted tubules as mentioned in the case of Sheep I and Sheep II, but no other deviation from the normal could be seen.

Sheep III was the only animal in which marked variations from the normal could be observed and the change was only evident on *microscopical* examination. Changes were observed both in the parenchymatous and interstitial tissues. There was a marked congestion of the blood vessels throughout the organ. In the cortex the blood had undergone a change. In places individual corpuscles could no longer be seen, the blood appearing homogeneous as though it had become hæmolyzed. In the cortex the glomeruli showed a marked congestion and the presence of young fibroblast cells. Bowman's capsule was much thickened and fibrous. The cells of the collecting tubules showed the greatest change, there being an actual necrosis of the nuclei. In others, in which the degeneration was not so advanced, the cells were swollen, the cytoplasm was highly granular and the outline of the cells very indistinct. In most of the tubules a fine network could be seen passing across the lumen from cell to cell accompanied by evidence of proliferation of these cells. In addition to the congestion numerous young fibroblasts could be seen between the tubules in both the cortex and the medulla.

In the case of Sheep VI, which had the casein diet, i.e. that with the highest percentage of protein, the kidneys showed the least change

of all those in this series, only the slight alteration in the epithelium of the convoluted tubules previously noted being evident.

The livers of Sheep III, IV, V and VI showed no sign of any pathological lesion of a gross nature. The nuclei stained well and the cells showed the usual variation in staining intensity. The sinusoids were evident and did not contain much blood and the Kupffer cells showed the usual intense staining reaction with haemotoxylin.

The other organs were quite normal in all the sheep examined.

Description of Feeding Experiments on Batches of Lambs on High Protein Diets under Normal Conditions.

As a corroboration of the experiments carried out on sheep under the unnatural conditions of the metabolism cage, it was considered advisable for the purpose of comparison to feed a number of lambs on a high protein ration and permit them to eat and digest it under natural conditions. During the Spring and Summer of 1928, young lambs were fed for varying periods on different rations, each with a high protein content. It was desired that, when these lambs were put on experiment, they should be of an age at which they have most difficulty in dealing with a sudden increase in protein in their diet. The age regarded as most suitable for this purpose was from 8 to 10 weeks, since by that time they would not have long been off their mother's milk, and would be unaccustomed to a diet consisting largely of concentrated food. Consequently some adjustment would have to be made to deal with this new diet. Since the ingestion of considerable quantities of protein entails extra work for the kidneys, it was thought that these young lambs would be more likely to exhibit disorders of those organs than would older animals which had already been educated to such dietetic conditions.

The lambs were divided into batches of four or six, according to the number available for use at the time. Each batch was penned in a field of young pasture grass so that in addition to the ration weighed out for them in their feeding troughs, they had an extra supply of protein from the grass itself which, at that period of the year, has a very high protein content (16). At intervals during the experiment samples of urine were obtained from the lambs and analysed clinically. The lambs were usually left on experiment for two or three months. It was thought that if no sign of renal or other organic trouble had manifested itself by that time, it would probably never do so.

Details of the High Protein Feeding Experiments.

Experiment 1.

Four lambs, aged 9 or 10 weeks, were placed on experiment in the middle of February on a diet consisting of linseed cake, oats, and chaff.

The average daily ration of each lamb at the start of the experiment was $1\frac{1}{2}$ lbs. of linseed cake, $\frac{1}{4}$ lb. oats, $\frac{1}{4}$ lb. of chaff, which has a protein content of approximately 198 gms. Since all the feed was in one trough it was more than probable that it was not equally distributed, and that one lamb received more than its share whilst another had to do with less. This difficulty in accurately gauging the amount eaten by each lamb is present in all the feeding experiments described in this series, but the conditions are the same as those under which normal lambs are fed and among which pathological changes do occur in the kidneys. The young lambs in this first experiment ate their feed readily and by the end of the first fortnight the consumption of linseed cake had increased to 3 lbs. per head per diem, or about 340 gms. of protein. This was continued for a period of eight weeks. During this period the lambs appeared to make normal progress and to be fine, healthy, animals. At intervals during the experiment a chemical analysis was made of samples of urine obtained from each of the lambs. In all cases a slight albuminuria was present and the urine was found to give an alkaline reaction. With this exception it appeared normal, and there was no indication of abnormal functioning of the kidneys.

Experiment 2.

Five lambs aged about eleven weeks were put on experiment on the 8th May. Their ration consisted of crushed beans, flaked maize and linseed cake. At the commencement of the experiment the ration consisted of equal parts of these three constituents, and 1 lb. of the mixture was allowed to each lamb, the average daily consumption of protein being approximately 83 gms. The linseed cake was gradually increased until each lamb received 2 lb. of linseed cake, $\frac{1}{3}$ lb. crushed beans and $\frac{1}{3}$ lb. flaked maize, having a protein content of 286 gms. This proved to be the maximum amount of the ration which these lambs would consume. Attempts were made to render the diet more tempting by the addition of sugar beet pulp, but this failed, and the lambs therefore received the above diet for eight weeks. During this period they gained in weight and appeared to thrive. Samples of urine were taken at frequent intervals and as in the case of Experiment 1, a trace of albumin was always present. Since there was no further clinical evidence of disorder of the kidneys the lambs were taken off experiment on July 22nd having been nearly three months on the high protein diet.

The ration fed to this batch of lambs is exactly that which was supposed to give rise to the condition of "pulpy kidney" noted in Case 1 (see page 3). It will be noted that the protein content was increased to 400% above that which was supposed to produce the disease and as will be seen no apparent ill-effects could be traced.

Experiment 3.

Six lambs, ten weeks of age, were put on experiment on 7th June. The diet, which consisted of linseed cake, oats and chaff, was similar to that fed in Experiment 1. The initial ration was composed of $\frac{1}{2}$ lb. of linseed cake, $\frac{1}{4}$ lb. of oats, and $\frac{1}{4}$ lb. of chaff, having a protein content of 75 gms. By successive increases in the quantity of linseed cake the amount of protein consumed was ultimately 256 gms. Quantities in excess of this were refused and the ration was therefore maintained at this level during the rest of the experiment. As in the case of the other batches, examination of the urine revealed nothing more than a slight albuminuria, and as there was no evidence that the ration was producing any harmful effects in any of the lambs the experiment was terminated after eleven weeks.

Experiment 4.

Three lambs of about eight weeks were put on a ration of $\frac{1}{4}$ lb. of linseed cake, $\frac{1}{4}$ lb. of oats, and $\frac{1}{4}$ lb. of chaff, the average protein content being 42 gms. By this time the grass of their pen was of a very luxuriant nature, and it was with difficulty that the lambs could be persuaded to consume the artificial foods provided for them in the troughs. However, the ration was increased to $1\frac{1}{2}$ lbs. of linseed cake, $\frac{1}{4}$ lb. of oats, and $\frac{1}{4}$ lb. of chaff, the protein content of which was 186 gms. A conservative estimate placed the amount of grass consumed by each lamb at 1,000 gms. daily, which added another seventy-five to one hundred grams of protein to their daily ration, making a total of approximately 260 gms.

The lambs of this group were slightly younger than were those in the preceding experiments and probably ate more of the easily digested food, the pasture grass. Further, although they did not consume so much of the artificial food, their rate of growth appeared to be more rapid than that of the lambs in the other batches. These lambs were continued on experiment over twelve weeks, and even at the end of that time they did not take more of the ration supplied to them in their feeding troughs, but they ate the grass of their pen so quickly that it had to be repeatedly moved to different parts of the field. This batch showed a more marked albuminuria, but no harmful effects could be observed, the animals thriving and showing quite a considerable gain in weight.

Experiment 5.

Six unweaned lambs were penned in such a manner as to allow them free access to the ewe, whilst the ewes could not reach the ration provided for the lambs. This was accomplished by allowing sufficient space between some of the hurdles composing the pen for a lamb to

pass through but insufficient for an adult sheep. In order to make sure that they would suck their mothers, the lambs were allowed to run with the ewes twice a day, and were then repenned. From the disappearance of the ration in the troughs and observation of the ewes, it was found that the plan worked satisfactorily, since the lambs took both the artificial food and their mother's milk, and probably some of the young grass in their pen. With such young lambs it was difficult to give a really high ration to start with, and an initial feed of 1 lb. flaked maize, 1 lb. of crushed beans, and $\frac{1}{2}$ lb. of linseed cake was divided amongst them which provided each lamb with about 35 gms. protein plus the amount in their mother's milk. The artificial ration was gradually increased till the six received 3 lbs. of flaked maize, 3 lbs. of crushed beans, and 3 lbs. of linseed cake, which would give each a daily protein allowance of about 140 gms. By this time they had ceased having the ewe's milk, but to compensate for this the grass of the pen had reached the stage when the protein content would be very high, and taking this into account, they were probably consuming well over 200 gms. protein per diem. The amount of artificial food could not be increased, but they maintained the high level till the end of the experiment, which lasted twelve weeks.

Clinical examination of the urine of these younger lambs showed, as in those in Experiment 4, a somewhat higher albuminuria than that in the other batches, but no trace of casts or other signs of kidney disruption could be found. It would appear, therefore, that even those very young lambs could eventually become accustomed to a high protein ration without any serious clinical effects being produced.

The result of this last experiment is of considerable interest, since New Zealand workers (2) engaged on research into the aetiology of "pulpy kidney" disease have suggested that a possible cause of the deterioration of the kidneys of young lambs might be due to the protein of ewe's milk.

Discussion of Results.

In discussing the results of this series of experiments, it must be observed that in one respect they cannot be compared with those obtained by Osborne and Mendel (10) in rats or Newburgh (5) in rabbits. The primary object of the experiments was to obtain information which would be of some practical value, in elucidating the cause of "Pulpy Kidney Disease in Sheep." For this reason the diets which were employed with the possible exception of that fed to Sheep VI, were of quite a usual nature in respect of their composition, and not of an unnatural character such as a diet consisting of 85% or 90% of casein. Under these conditions it was not possible to employ a diet containing a proportion of protein of the same order as that used by

Osborne and Mendel. The term "excessive protein diet" used in this paper is intended to imply that the amount of protein which was fed was very much in excess (400-600%) of that contained in the normal ration of sheep. The diets fed to the lambs in the feeding experiments in the field were all based on diets which had been alleged to cause deterioration of the kidneys in lambs. When we consider that the protein content had been increased by 600% and that the lambs were all of that age when they would have most difficulty in dealing with an excessive protein diet it is interesting to observe the singular uniformity of the results.

The account of the macroscopical and microscopical findings given with the exception of that of Sheep III, shows definitely that no gross lesions were produced by feeding for a considerable period of time on diets containing an abnormally high amount of protein. The slight variation from the normal observed on microscopical examination of the kidneys of all the sheep except Sheep III, namely a slight change in the epithelium of the convoluted tubules which cannot be regarded as of pathological importance, must not be considered *per se* a disorder of such a nature as to impair the functions of these organs. The rather more serious changes in Sheep III, namely the slight congestion of the blood vessels, the more marked congestion of the glomeruli and the necrosis of the nuclei of the cells of the collecting tubules is worthy of consideration. The clinical examination of the urine of Sheep III did not show any material difference from that of the other sheep, sugar was absent, casts were not found and the albuminuria was no more marked in this than in the other animals. Sheep III and Sheep IV, up to the point of Sheep III's death, showed identical metabolism of the protein of their ration. Sheep IV, however, was kept on experiment for a further four months on the same ration and, as is seen, showed only very slight changes in the kidneys. It is doubtful, therefore, if the more profound changes seen in the kidneys of Sheep III can be ascribed to the results of high protein feeding, especially having regard to the results obtained in the rest of the animals on experiment. As has been pointed out, the kidneys of lambs are reduced to pulp in the short space of a few days by some cause which is alleged to be of dietetic origin, and has been regarded by several observers as due to excessive amount of protein in the ration. If extensive disruption of the kidney tissues can be brought about as rapidly as is observed in cases of "Pulpy Kidney Disease" as a result of feeding on diets abnormally rich in protein it would be reasonable to suppose that some gross pathological changes would have been produced in the kidneys of the sheep employed in these experiments. These experiments show, however, that the kidneys accommodate

themselves with remarkable rapidity to the extra work thrown upon them by enormous increases in the protein of the diet.

That the extra protein was digested and not just excreted as waste material via the fæces is illustrated by Table II, which shows that, as the protein consumption of Sheep III and IV increased, the output of nitrogen by the urine increased also while that by way of the fæces remained remarkably constant throughout.

Table II.

SHEEP IV.			SHEEP IV.			SHEEP III.		
Comp. Fæces. Urine.			Comp. Fæces. Urine.			Comp. Fæces. Urine.		
No.			No.			No.		
	gms.	gms.		gms.	gms.		gms.	gms.
1	8.36	18.71	26	6.86	37.46	1	6.4	13.04
2	7.63	20.42	27	7.44	38.82	2	10.39	16.97
3	7.97	20.08	28	8.51	41.71	3	9.35	15.23
4	8.70	24.65	29	9.54	47.47	4	8.97	13.24
5	9.50	28.12	30	10.87	49.33	5	8.95	18.15
6	11.36	25.50	31	10.80	46.69	6	11.30	17.96
7	11.26	30.02	32	8.91	44.51	7	9.38	26.10
8	11.48	32.88	33	8.78	40.57	8	9.51	26.70
9	21.96	38.08	34	10.65	37.16	9	8.74	26.33
10	12.81	41.01	35	10.62	38.29	10	9.57	30.99
11	14.85	45.83	36	9.42	36.50	11	11.62	38.85
12	13.77	47.74	37	9.80	31.84	12	10.35	38.85
13	11.55	38.44	38	9.34	39.97	13	11.98	42.47
14	13.51	52.44	39	9.84	39.71	14	11.47	43.22
15	11.25	40.03	40	8.68	37.30	15	12.32	47.32
16	13.02	54.23	41	9.15	37.56	16	11.56	40.77
17	11.25	47.00	42	7.45	44.41	17	13.42	48.48
18	13.02	38.17	43	9.96	39.16	18	10.76	44.96
19	10.00	35.74	44	8.55	43.63	19	8.40	42.93
20	8.49	38.29	45	6.76	40.53	20	7.86	38.69
21	8.49	35.74	46	4.49	22.50	21	8.97	36.21
22	7.27	38.29	47	2.45	16.54	22	8.44	31.92
23	7.64	33.84	48	1.93	25.20	23	7.96	39.24
24	8.08	34.54	49	4.34	28.82	24	8.94	34.70
25	7.86	38.33	50	4.84	27.66			

Conclusion.

The results of these experiments do not support the findings of Newburgh (5) that a high protein diet is injurious to the kidneys.

Even the slight physiological change attributed by Osborne and Mendel (10) to high protein feeding, namely the hypertrophy of the kidneys which they invariably found on *post-mortem* examination of the rats kept on high protein diet, could not be confirmed in the case of sheep.

In the experiments described there was no evidence that excessive amounts of protein in the diet of sheep were productive of any definite disorganisation of the kidneys of those animals (with the single exception of Sheep III, in which the lesions may, or may not, have been due to the high protein feeding). An hypertrophy, if produced, was of so slight a nature as to be incapable of being detected.

Taking these conclusions into consideration, therefore, it must be agreed that high protein diets are not in any way responsible for that condition in sheep known as "Pulpy Kidney Disease." In endeavouring to arrive at the probable cause of the disease, many baffling features present themselves, but in the judgment of the writer based upon the results of the present experiments *excess of protein* in the diet can no longer be regarded as the primary factor in the causation of this disease.

In conclusion, the writer wishes to acknowledge the more than active interest shown by Professor J. B. Buxton in the work, and also to express his thanks to his colleagues, Mr. T. J. Bosworth and Mr. R. E. Glover, for much help and valuable assistance in making the histological examination of the specimens.

REFERENCES.

- (1) Wood, "Animal Nutrition."
- (2) Gill, *New Zealand Journal of Agric.*, April, 1927.
- (3) Dakin, quoted from Albiston, *Australian Journal Exper. Biol. and Med. Sci.*, 1927, June.
- (4) Owen-Johnson, quoted from Gill, *New Zealand Journal of Agric.*, March, 1928.
- (5) Newburgh, *Arch. Int. Med.*, 24, 359.
- (6) Newburgh & Clarkson, *Arch. Int. Med.*, 1923, 32, 850.
- (7) Frandsen, *C. r. Soc. de Biol.*, 91, 413.
- (8) Polvogt, McCollum & Simmonds, *Bull. Johns Hopkins, Hosp.*, 1923, 34, 168.
- (9) Jackson & Riggs, *Journal Biol. Chem.*, 1926, 67, 101.
- (10) Osborne & Mendel, *Journal Biol. Chem.*, 1924, 59, 13.
- (11) Osborne, Mendel, Park & Winternitz, *Journal Biol. Chem.*, 1926-27, 71, 317.
- (12) Reader & Drummond, *Journal Physiol.*, 1924-25, 59, 472.
- (13) MacLean, Smith & Urquhart, *Journal of Exper. Path.*, 7, 360.
- (14) Addis, MacKay & MacKay, *Journal Biol. Chem.*, 1926-27, 71, 139.
- (15) Wood & Woodman, *Journal Agric. Sci.*, 1921, 9, 304.
- (16) Woodman, Blunt & Stewart, *Journal Agric. Sci.*, 1926, 16, 205.
- (17) Stewart, *Vet. Record* (In Press).

Clinical Articles

A Strange Case in a Bull.

By T. W. HUGHES, M.R.C.V.S.

Mold, Flintshire.

SUBJECT.—A 2 year old Shorthorn bull, a Royal Show and Welsh National Show winner, and winner of various first prizes. The owner came to the surgery for some tonic powders for him and said he thought he was a little off colour after the Royal Show. A few days previously he was awarded first prize in his class there. He did not improve so I was asked to see him. His temperature was normal; the pulse 80 per minute and weak was the only bad symptom he showed. The dung was normal but he would not take a bit of food. He got gradually worse, a grunt developed when he moved, and it was noticed he showed pain when he urinated. A sample of his urine was examined and kidney trouble was diagnosed. Per rectum a large mass could be felt. He died about a fortnight after we first saw him. *Post-mortem* revealed the right kidney 60 lbs. in weight and the left 72 lbs. The remarkable thing was he showed no previous symptoms and was in prime condition.

The normal weight of an ox kidney is about 26 ounces.

A Case for Diagnosis.

By T. W. HUGHES, M.R.C.V.S.

Mold, Flintshire.

THREE years ago I bought a 16-2 hands, 6 years old, blood hunter very cheap. His history was bad and he was given to a friend of mine who let me have him for next to nothing. I took him as a pure gamble. The previous season he had fallen and was supposed to have hurt his spine. He had done nothing for 12 months. The symptom he showed was a peculiar stiffness varying in degree. When my friend first got him he gave him a little canter and a few minutes afterwards he could not move. Strange to relate the horse was sound when he arrived at my place. It was the month of October and he was put into regular work. All went well for about three weeks. Then my assistant and I had him out with another horse and went about 2 miles across country at a nice gallop. After breakfast the groom came to tell me that the horse in question was in great pain. I found that this was the case. He was sweating and looked as if he had got tetanus. These symptoms he had regularly shown with my friend before I got him. But it was remarkable that the next day he was sound and went to exercise. A week afterwards I took him hunting. On the way to the meet he went

lame behind, but I kept on. The lameness disappeared. He had a hard day and came home sound. He averaged three days a fortnight through the season and kept sound. I sold him the next season and he has since won a number of point to point races and hunt chases. Can anyone suggest what his trouble was? He received no treatment of any kind as I had no idea what was the cause of his ailment. I may add I have seen him many times since, but he has had no further attack.

Some Clinical Cases from Somaliland.

By T. A. COCKSEGE, M.R.C.V.S.,
Chief Veterinary Officer, British Somaliland.

Primary Iritis in a Foal.

A SIX-WEEKS-OLD foal, bred in the Stud Farm, was brought to me with the history of eye-trouble. On examination two points were immediately noticed; there was no conjunctivitis and there was what looked, on first examination, very like hypopyon. As there was a medical officer on the spot who is somewhat of an eye specialist, I asked him to come and have a look at it. He was delighted and, as I had to go off to another district, he very kindly took charge of the case for me, with, I am glad to say, excellent results, as to-day the colt is doing excellently and apparently has quite normal sight. The line of treatment taken was to thoroughly wash out the eye with silver proteinate, followed by irrigating with normal saline in order to be sure the whole organ and surroundings were thoroughly clean, and one per cent. atropine sulphate drops put in finally. The eye was kept covered and for the first four days poultices were applied in the evening. The colt was sent back to the grazing ground in about a month.

Dislocation of the Shoulder in Cow.

By EUSTACE J. LAINÉ, M.R.C.V.S.,
Guernsey.

SUBJECT.—Young Guernsey cow near calving for the second time.

On April 27th the owner found the animal, which was alone in the byre, very lame. He led her on to some pasture a few yards away, and, finding she could hardly walk, sent for me. Examination showed dislocation of the right shoulder joint, and manipulation proved that reduction was impossible without casting. As the patient was so heavily in calf I advised leaving the operation till after the calving, and prescribed slow movement of the limb, constant bathing, and the application of a cooling lotion several times a day.

I visited occasionally and though I was satisfied it was better

to wait I could see that the owner was impatient and that he wanted something done. I asked to be allowed to get Mr. G. Foote's advice. He came, examined the cow and was of opinion that nothing could be done till some days after calving.

The calf was born, without help, on May 20th. On May 30th Mr. Foote and I reduced the dislocation as follows: A drench containing chloral hydras was administered and the animal cast on straw in the yard in the usual way; the injured leg being uppermost. The patient was secured by girth ropes to an iron pipe driven between three and four feet into the ground. Padded ropes were then fixed to the limb above the knee and above the fetlock. Six stout men were then asked to put steady but heavy traction on the limb and by jumping on the arm in stocking feet (as described by Williams), when the leg was fully drawn reduction was effected. When released the animal, which had left the shed on three legs, ran away with two men hanging on to its halter. A blister was immediately applied and every subsequent visit revealed that the reduction had been a complete success. I have seen the cow, a valuable one, several times since, and at the present time it would be impossible to say that there had ever been anything amiss with her.

Some Variations in the Number of Ribs in Pigs.

By D. J. ANTHONY, M.R.C.V.S., D.V.S.M.

Messrs. Marsh & Baxter, Ltd., Brierley Hill.

A RECENT inquiry from the University of Saskatchewan, Canada, has prompted me to pay some attention to the numbers of pairs of ribs in pigs of various breeds, and I have been rather astonished at the variation existing, even in pigs from the same litter.

Text books of Veterinary Anatomy give the number of ribs in the pig as "usually 14 pairs, and sometimes 15 pairs." Few people connected with the pig industry seem to have any idea as to the variation occurring in the different breeds. To the Anatomist this variation in the number of ribs in pigs may be of little interest, but to Bacon Curers it is of great practical value, in that more ribs mean a longer side of bacon. In the production of the "ideal" bacon pig it is important to pay attention to the length of side, and some curers, who are also breeders of pigs, maintain that the Welsh and Large White breeds give long sides of bacon, whereas the Middle Whites and Lincolnshires, etc., give a short side. Every Breed Society upholds its own particular breed as the "ideal," with the result that one finds all sorts of pigs entering English Bacon Factories. There is an utter lack of that uniformity which characterises the Danish and Irish Bacon pig.

The following is a list of 292 pigs whose ribs were counted by myself, and although it is far from complete as regards some breeds, yet it gives an interesting sidelight on the variations occurring in certain types. I have only included animals whose breed was known beyond any doubt.

Breeds.	No. of pigs ex- amined.	No. of pairs of ribs.		
		14 pairs	15 pairs	16 pairs
PURE BREEDS—				
Large White	10	8	2	—
Middle White	54	27	25	2
Welsh	54	16	36	2
Large Black	10	8	2	—
Lincolnshire Curly-coated	41	34	7	—
Berkshire	3	3	—	—
Gloucester Spot	2	—	2	—
Wessex Saddlebacks	13	8	5	—
CROSS BREEDS—				
Large White Boar x Welsh sow	13	7	6	—
do. do. x Middle White sow	2	—	2	—
Large White x Essex	6	—	5	1
Large White x Large Black	3	3	—	—
Welsh Boar x Large White sow	12	—	9	3
do. x Cross-bred sow	57	22	28	7
Tamworth x Gloster spot	12	8	4	—
TOTALS	292	144	133	15

Visceral Gout in Poultry.

By G. MAYALL, M.R.C.V.S.

It is questionable whether visceral gout in the fowl is as well known among poultry pathologists as it deserves to be. It is an interesting disease, and the only one that I know of that covers the liver, heart, pericardium, pleuroperitoneum and the serous coverings of other organs with an extensive white deposit which has been likened to hoar frost, chalk or plaster of Paris. The deposit is really urate of soda. The malady is said to occur in birds kept confined, such as pigeons and in birds of prey in the Zoological Gardens and in cage birds and is met with also in guinea fowls, pheasants, ducks and geese. The heavy breeds of fowls such as the Brahma and Cochin China are considered to be most predisposed to it but I have found it in the Leghorn, Plymouth Rock, Rhode Island Red, Ancona, White Wyandotte and Black Minorca.

THE CAUSES are giving food rich in protein, one sided feeding and insufficient exercise. Few of the birds I have examined have received meat, but many of them excessive quantities of wheat, oats, barley or

maize. Gmelin attributes the inclination of fowls to gout to be due to their ability to deal largely and quickly with nitrogenous food (70 per cent. of which is secreted as uric acid). The secretion of the urate on the surface of the serosa causes no inflammatory condition. It is brought about in a reactionless way and thanks to the presence of a stasis transudate it passes out from the well-filled capillaries and veins of the subserosa. The blood plasma rich with uric acid comes on the surface and there the uric acid loses its solvent (acid phosphate of soda) and is deposited. In the sediment only a little fibrin, put out at the same time, is imbedded.

Symptoms.

Visceral gout is not often recognised during life, but there may be weakness, loss of appetite, diarrhoea, lack of good condition and a dark blue colour of the comb.

THE POST-MORTEM SYMPTOMS are usually quite plain. In addition to those previously mentioned the kidneys are often enlarged and sprinkled throughout with white uric acid crystals. The heart and pericardium may be fused together. On the intestinal mucosa and endocardium uric acid crystals may sometimes be seen.

MICROSCOPICALLY. The chalky concrement may be rubbed down with water or very dilute hydrochloric acid and when examined, fine needles in radiated form, or sheaf-like bundles of uric acid crystals may be seen. A more delicate and interesting test is to rub up the material to be examined (e.g. some of the white deposit) in a porcelain mortar with a few drops of concentrated nitric acid and dry it by slow heating, when a reddish bulbous residue is formed. This residue turns purple red on the addition of a drop of ammonia and blue violet on the addition of a drop of sodium hydrate (murexide test).

TREATMENT is to change the food and put the fowls out on grass ; green food is advocated and not much corn—sodium bicarbonate, lithium sulphate, tincture of colchicum or salicylic acid as pills are medicinal remedies to be advocated.

REFERENCES.

- Lehrbuch der Gefügelkrankheiten—Dr. Richard Reinhardt, 2nd Edition.
Maladies des Volailles—Dr. J. Lahaye, 1928.
Poultry Diseases—Dr. B. F. Kaupp, 3rd Edition.
A Manual of Clinical Chemistry—Dr. M. Klopstock and Dr. A. Kowarsky.

Abstracts of Current Literature

Eber, Professor, of Leipzig.—Can Bovine Tuberculosis be countered by Preventive Vaccinations?—*Deutsche Tierärztliche Woch*, May 12th, 1928.

THE problem of antituberculous immunisation with the help of attenuated tuberculous virus has been the object of numerous and varied researches; but von Behring has been the first to create an active immunity against Koch's bacillus. The bovo-vaccine of von Behring with a base of attenuated human bacilli, introduced intravenously, the Tauruman of Koch, Schütz, Neufeld and Miessner, the antiphymatol of Klimmer, the process of Heymans, of undoubted efficacy in laboratory tests have not been able to produce a like sufficient immunity against natural infection in the cowsheds. The processes have gradually fallen into desuetude; but some years after the war two new vaccination procedures have claimed attention: (1) The vaccine Calmette-Guérin, the B.C.G. constituted by *living absolutely avirulent* bacilli; (2) the process of Selter, Knauer, and Blumenberg using *living and attenuated bacilli*.

Calmette and Guérin are of opinion that, under the action of B.C.G. a symbiosis of Koch's bacilli takes place, living and avirulent, with the cellular elements, a symbiosis which activates the resistance of the organism so long that living bacilli persist in the lymphoid milieu. The immunity disappears when the bacilli have been eliminated by the natural ways. The vaccination, considered harmless, ought to be repeated each year.

What of the theory of Calmette? The B.C.G. reinforcing the resistance of the organism against the bacillus of Koch for a year, the result obtained is identical with that which was procured by the bovo-vaccine of Behring, the tauruman of Koch, and the antiphymatol of Klimmer. We do not yet possess data concerning the efficacy of B.C.G. in bovines arrived at the period of active sexual life; but it is likely that the B.C.G. with an aggressive character less violent than the bovo-vaccine and tauruman will not give better results than those obtained by the use of the two German vaccines. It is to be feared that the repeated injection of B.C.G. into cows in the lactation period may not be as harmless as in young calves. To sum up, we see no irrefutable tests concerning the efficacy of B.C.G., there is no reason to anticipate a success by its use in the fight against tuberculosis. As for the process of Selter, Knauer and Blumenberg, a living bacillus is utilised, of greatly attenuated virulence by a sojourn of seven weeks in the stove, repeated passages over culture media, and a mechanical

fragmentation by pounding in an agate mortar. The first process tends to avoid the production of any tuberculous lesion, the immunity resulting from a kind of symbiosis, badly defined, between the microbes and the organic cells; the second tends to the edification of a persistent local lesion, assuring a marked resistance in respect to an accidental infection for as far as living bacilli persist in the lymphatic tissue (the process is no other than that recommended by Vallée since 1911).

The method of Selter is based on the same principle as that of Heymans and it is established that the existence of a local focus does not constitute a sufficient protection. One confirms, on the contrary, the passage of bacilli into the blood, with the production of insidious forms of mammites, difficult to recognise and elimination of bacilli by the milk. On the other hand, the diminution of organic resistance, from whatever cause it may be, exposes to a malign evolution.

It behoves one still to await the age of puberty of vaccinated animals before deciding on the efficacy of the vaccine and also on the question of knowing if the bacilli remain harmless throughout the life of the animal. The process of Ostertag, the accidental ingestion in infected media of very small quantities of bacilli by calves with the production of benign foci of tuberculosis and mobilisation of the organic defence attains the best result sought. Nevertheless, the success of the intervention will depend essentially on the conditions of upkeep of the animals, the absence of all bad treatment and of a permanent control of effectives, with periodical clinical examinations and slaughter of animal carriers with open lesions.

Sjollema.—Pathogeny and Treatment of Milk Fever.—*Tijdschrift voor Diergeneeskunde*, December 1st, 1928.

ANALYSES of the blood of cows affected with milk fever shows that hypoglycæmia is rarely found, that the alkaline reserve is normal, but that the cypher of calcium is diminished (5 mmgr. per 100) as well as the inorganic phosphoric acid.

These facts confirm the theory of Kraus and Zondek, who consider that the disturbances of the regulator mechanism are due in milk fever to a deficiency of calcium; the sympathetic system has no longer its normal tone and the vegetative functioning is perverted. In big milkers the great needs in calcium and phosphate during lactation would not be satisfied as a result of a parathyroidean insufficiency.

This hypothesis seems to be well founded from the fact that cows affected with milk fever are rapidly cured after an intravenous

injection of three to 400 cubic centimetres of a solution of calcium chloride at 10 per cent. The action of this last is also favoured by the administration of parathyroidean extract.

From a prophylactic point of view chloride of calcium and vitamin D are to be recommended.

Reviews

Studies on Malaria. By COLONEL SIR RONALD ROSS, K.C.B., K.C.M.G., F.R.S., Nobel Laureate. Author of "Memoirs: with a Full Account of the Great Malaria Problem and its Solution," etc. London: John Murray, Albemarle Street, W.1. With illustrations. 5s. net.

THIS is a small and inexpensive book containing the essential facts connected with the author's work on malaria commenced in 1895, and described at length, with other matter in his *Memoirs* of 1923.

The first chapter mentions previous discoveries and speculations on malaria, with the object of his own researches. The author then proceeds to describe the first stage of his investigation in India which led to the fundamental discovery of the "Pigmented Cells" in 1897; and proceeds with a description of his researches which disclosed the whole general life-history of the malaria-parasites in mosquitoes early in 1898.

Chapter IV describes the confirmations and extensions of his work in Italy in 1898, and in Freetown in 1899. The details of his numerous attempts to get his discovery applied for the prevention of the disease and the saving of human life in many countries are given in the rest of the work, beginning with Sierra Leone and West Africa.

Chapter IX mentions the American discovery of 1900 regarding yellow fever and mosquitoes, and Chapter XIII deals with the classical case of malaria-control by mosquito-control at Ismailia in 1902. The work of Gorgas at Havana and Panama is summarised, and then follows Chapters connected with Greece, Mauritius, India, Cyprus, and the War and after, when Sir Ronald was Consultant in Malaria at the War Office, concluding with recent tours in Ceylon and India.

Chapter XX is concerned with his "Studies on Pathometry," that is, the *quantitative* study of infectious diseases.

The last Chapter supplies a useful summary of facts about malaria, which will be specially valuable to planters and others who are forced to live in malarious areas.

A useful bibliography and an index complete a work which the author was asked to publish by many correspondents in India and elsewhere at a low price.

There are four full-page photographs, namely, a group of W. C. Gorgas, Sir Ronald Ross, and H. Claye Weeks as the frontispiece; the other three being of Dr. Laveran, Sir Patrick Manson and Sir Malcolm Watson.

Œsophagoscopie bei Hunden und Katzen. By DR. HEINRICH SUCHANEK (assistant in the Surgical Clinic at the Veterinary College, Vienna).

THE object of this research work was to test the practicability of œsophagoscopy, as used in human surgery, for diagnosis and treatment of foreign body—and diseased conditions—of the œsophagus in the dog and cat.

There is an allusion to past and present endoscopic instruments used in human and veterinary surgery; quotations from human and veterinary literature relative to œsophageal diseases and foreign bodies; and from case records of the Vienna clinic during 20 years (1907-26).

The anatomical features are described with particular reference to endoscopy. The writer found no difficulty in passing a straight tube 3 cm. in diameter into the stomach of a German sheepdog. Instruments consist of an illuminator, double observation tubes, one sliding inside the other—both of oval cross-section (these are made in four calibres and variable length); and an instrument for securing and extracting the foreign body—which is passed through the observation tube. A fine swab carrier and a stomach juice pump complete the apparatus.

The patient is to be deeply narcotised by a drug that does not cause emesis. Chloral hydrate per rectum—gr. iv.ss per lb. body weight is recommended.

Indications for endoscopy arise after a negative result with X-rays, which only show up metallic and bony, etc., bodies well, and in cases of a small body whose position cannot be with certainty diagnosed by the passage of a sound. In addition, endoscopy provides the only means of diagnosing such lesions of the œsophageal wall as neoplasms, diverticula, stenosis, etc., and except for very large bodies, such as sharp pieces of bone, held up, the instrument that can be passed down the observation tube, can effect removal of the body without the necessity of œsophagotomy, with the advantage that the operator can actually see what he is doing all the time. Clinical case quotations show that œsophagoscopy forms a most useful diagnostic aid and demonstrate the value of being able to use one's eyesight while at the same time securing a body held fast in the œsophageal wall.

The booklet is well written and provided with excellent photographs of the instruments used and coloured pictures of views seen through them.

Correspondence

Our President and the General Election.

The Editor, THE VETERINARY JOURNAL, London.

DEAR SIR,—

Although members of the Veterinary Profession belong to different Political Parties, we all realise the importance of having a member of our profession in Parliament, whether he be Conservative, Liberal or Labour.

For years we have been dreaming of the future, but these dreams will never come true if we are content to only dream them. We have been living in our own little sphere doing excellent work chiefly from the scientific point of view but neglecting those big and practical national issues on

which the prosperity of every member of the Veterinary Profession (particularly the Practitioners) depends.

In our President we have one of the most able men this profession has produced and one who has the welfare of the Veterinary Profession always at heart. He has entered the busy field of Politics in spite of his many other calls, and with his eloquence and expert knowledge of Agriculture and Veterinary matters should prove himself to be a great help to the Country, since such services are so badly needed. The Services of the Veterinary Profession to Great Britain are often underestimated but this country cannot afford to do without them. When we bestow the honour of Presidency on one of our members he deserves all the help we can give him in all his undertakings. The task before him is a great one. There are many ways in which the members of the Profession can help in a matter of this kind. Voters could be influenced in divers ways but there is one simple but practical way of rendering very material assistance, as all who are acquainted with present day elections know. The question of an adequate supply of motor cars on the day of the election is one of the highest importance, and it would be asking little of most of the members of the Profession to send a car on the Election Day. The Constituency which our President is fighting is an extremely large one and an enormous number of cars will be required. Will anyone willing to send their cars, send their names to one of us, or direct to the Liberal Agent, Liberal Club, Oswestry; and please state whether accommodation will be required on the preceding night for the driver and car.

C. WENTWORTH ELAM,

8, Roscommon Street, Liverpool.

W. K. TOWNSON,

30, Lincoln Road, Peterborough. ■

News

Bovine Tuberculosis Eradication in New York.

The number of animals condemned on account of tuberculosis during the fiscal years ending June 30, 1919, to 1928, inclusive in New York State was as follows:

1919.....	2,097
1920.....	6,842
1921.....	20,702
1922.....	10,780
1923.....	33,686
1924.....	39,149
1925.....	53,431
1926.....	63,963
1927.....	67,631
1928.....	54,945

Total.....353,226

The destruction of these tuberculous animals has reduced the infection in New York State from 28 or 30% in 1918 to approximately 10% at the present time.

Big Waiting Lists in Tuberculosis Eradication.

More than 2,000,000 cattle were on the waiting list for tuberculin testing at the end of 1928. This fact indicates an attitude of effective co-operation on the part of stock raisers and dairymen generally, and also that the 1929 record of tuberculin tests is likely to rank high in comparison with other years.

On January 1, a total of 629 counties in the United States had been recognized as "modified accredited areas, and cattle in accredited herds numbered 2,164,105. More than 23,000,000 cattle are in herds under bureau supervision for the eradication of tuberculosis, and the waiting list on January 1 numbered 2,160,517 cattle. In 33 States the demand for testing has outstripped the facilities for prompt response to applications, but the work of testing is proceeding rapidly. The test was administered to 845,971 cattle in December."

College Clinics.

Clinical work in the Veterinary Department of the Kansas State Agricultural College at Manhattan is constantly increasing in numbers. The following is a summary of the number of cases handled in the veterinary clinic for the past five years :

1923-24.....	3,599
1924-25.....	4,488
1925-26.....	5,764
1926-27.....	6,964
1927-28.....	9,841

For the 1927-28 college year there were treated by the clinical staff 439 horses, 2,224 cattle, 4,670 swine, 1,323 dogs, 567 sheep, 361 poultry, 152 cats, 16 goats, and 89 miscellaneous small and wild animals.

Students have actual contact with all these cases.

(Veterinary Medicine, May 1929.)

In the United States of America the tuberculosis death rate in the human reached a new low level in 1928, according to the Metropolitan Life Insurance Company. The death rate from tuberculosis in 1928 was 72.1 per 100,000.

(Veterinary Medicine, May 1929.)

Value of the New Export Cattle Quarantine Station.

As an illustration of the value to stockowners and pedigree breeders of the new Cattle Quarantine Station, established under the auspices of the Royal Agricultural Society at East India Dock, it is noted that during the week ending May 6th 32 cattle, of the approximate value of £9,000, have been exported to Australia alone. The total number of stock which has entered the Quarantine Station since it was opened on the 4th of April 1928, totals: cattle 347, sheep 126, pigs 60, goats 10.

Personal

HIS ROYAL HIGHNESS THE PRINCE OF WALES has graciously consented to become the Patron of the National Veterinary Association.

THE heartfelt sympathy of every member of the profession will go out to Sir John McFadyean and his family in the great loss which they have sustained by the death of Lady McFadyean, which occurred on May 3rd.

Lady McFadyean was the daughter of the late Principal Walley of the Royal (Dick) Veterinary College, and had thus spent her whole life in the Veterinary profession, being well known to a very large number of the members.

By the death of the Earl of Northbrook, the Royal Veterinary College loses not only its Treasurer, but one of its most enthusiastic and active supporters. Lord Northbrook took a prominent part in all Agricultural affairs, especially the side which concerned the fight against disease, and it was one of his greatest wishes to see the erection of the new hospital buildings, laboratories, etc. of the Royal Veterinary College completed. The Board of Governors was represented at the funeral by Sir Merrik Burrell, the Chairman of the General Purposes Committee.

MAJOR-GENERAL SIR JOHN MOORE represented the Royal College of Veterinary Surgeons at the recently held Fifth International Congress of Military Medicine and Pharmacy, which was held in London; and Lt. Col. Rainey was selected to represent the National Veterinary Association.

WE welcome the intention to publish shortly a Journal issued by the Royal Army Veterinary Corps, the first number to come out in November, under the editorship of Major A. A. Pryer, D.S.O. Col. W. A. Pallin, C.B.E., D.S.O. is Chairman of the Committee of Management, which also includes Lt.-Cols. Mosley, Gibbs, and Walker, Majors Holmes, Bamford, and Oxspring.

Publishers' Notices

All communications should be addressed to 7 & 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone: Gerrard 4646. Telegrams: "Baillière, Rand, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

Copy of advertisements should be in the hands of the publishers—Baillière, Tindall and Cox—not later than the 25th of the month, or if proof is required, not later than 23rd.

Binding Cases for Volume 84 and any other previous volumes can be obtained from the publishers. Price 2s. 9d. post free.

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THE VETERINARY JOURNAL

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PRINCIPAL OF THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor :

GLADSTONE MAYALL, M.R.C.V.S.

JUNE, 1929.

Editorials

BIRTHDAY HONOURS LIST.

MEMBERS of the profession will be pleased to note the names of three of their number in the King's Birthday Honours List—Mr. J. J. R. Jackson, M.R.C.V.S., Chief of the Veterinary Staff of the Ministry of Agriculture and Fisheries, who receives a Knighthood ; Colonel F. Johnson McCall, M.C., M.R.C.V.S., who is awarded a C.B.E. ; and Major Henry Allen, M.R.C.V.S., who is the recipient of an O.B.E. (Military Division).

Sir J. Ralph Jackson, who graduated from the London College in 1897, and whose photograph has already appeared in the VETERINARY JOURNAL for June, 1926, is well known to his colleagues in Great Britain and Ireland for the great organising work which he has done in connection with the Veterinary Department of the Ministry of Agriculture and Fisheries, where he succeeded the late Sir Stewart Stockman in 1926 ; and a number of the present methods of stamping out disease amongst farm stock owe their success to Sir Ralph Jackson's energy and foresight. The profession has every confidence in his judgment and has loyally co-operated in all the schemes which have been issued by the Department whilst under his control ; and the present satisfactory position of the steady eradication of contagious diseases from farm animals is a testimony to the esteem and respect in which he is held by his colleagues.

Lt.-Col. Frederick Johnson McCall, C.B.E., M.C., M.R.C.V.S., is a son of the late much revered and esteemed Principal McCall, the founder of the Glasgow Veterinary College, from which Colonel McCall graduated in 1908; and Major Henry Allen, O.B.E., M.R.C.V.S., R.A.V.C., who graduated from the London College in 1899, is at present in charge of the well-known Remount Depot at Mona, India.

We congratulate these three gentlemen on their well deserved honours.

THE ERADICATION OF SHEEP SCAB FROM GREAT BRITAIN.

EVERYONE interested in live stock and farm animals will have seen in the Agricultural and daily press the alarm note which was sounded by the Council of the Royal Agricultural Society on the increasing prevalence of sheep scab in Great Britain; and the apparent futility of controlling this troublesome disease, owing largely to the slack and inefficient manner in which the Regulations of the Ministry of Agriculture were sometimes carried out. Some idea of its increased prevalence can be gathered by the published returns of the Ministry which show that the total number of outbreaks up to the beginning of June, amount to 366 as against 274 at the same date last year.

The Veterinary Committee of the Royal Agricultural Society, whose Chairman, Sir Merrik Burrell, is well known to every member of the veterinary profession, took up this question a few months ago and issued letters to the Animal Committees of County Councils and other public bodies, urging that special attention should be devoted to the eradication and prevention of this disease. The result has been a very much greater activity against sheep scab and a much stricter administration of the order.

At the same time this is only the beginning of the greater effort which still remains to be made, and in our columns this month will be found two articles on the subject by experts which will prove most interesting reading, equally to practitioner and student. Mr. W. Jackson Young's name is too well known as an official of long experience with the Ministry of Agriculture and Fisheries to need any introduction, and the firm of Messrs. Cooper, Son & Nephews, originally founded by a member of our profession, has a reputation which extends not only throughout Great Britain and its Colonies but the whole world over.

We commend both articles to the careful perusal, as we have already said above, of practitioner and student alike.

General Articles

THE ERADICATION OF SHEEP SCAB.

By W. JACKSON YOUNG, F.R.C.V.S., D.V.S.M. (Vict.).

So much has been said and written by so many authorities on this subject that it is difficult, unless one comes fresh from some phase of research, to write anything which is not already known.

Agitations are going on at present pressing the Central and Local Authorities in Great Britain to utilise all powers possessed to eradicate this condition of the sheep's skin.

There are, however, many factors that militate against the success of the policy being adopted.

In some areas, continuous wet weather and the mountainous nature of the grazings may be held responsible, while in others, apathy, ignorance and inertia are the stumbling blocks.

The writer, after a lengthy experience of the administrative control of sheep scab is disappointed with the results obtained, more especially when he visits large sheep farms and finds no dipping apparatus, encounters owners and shepherds who do not understand the proper method of mixing dips and has numerous interviews with flockmasters who firmly believe that the condition will never be eradicated.

Examples of carelessness in gathering and dipping sheep are very numerous. Cunning methods of concealment have been adopted and unfortunately the penalties inflicted for such conduct have been totally inadequate.

Much more requires to be done before there is a diminution in the number of outbreaks. A properly organised educational campaign is urgently required and veterinary surgeons, inspectors (lay and veterinary), owners, shepherds, police officers, sheep dip manufacturers, dipping bath makers, technical chemists, pharmacists, biologists and wool brokers should each assist in making it successful.

The Veterinary Surgeon and Veterinary Inspector have the responsibility of reporting suspected cases and confirming the existence of the condition.

The Veterinary Inspector's opinion when he gives his decision in writing can be appealed against and, therefore, he is required to retain the parasite on which he bases the diagnosis. The parasites are more readily found at the periphery of the lesions and can be preserved mounted in Farrant's medium or in a small tin box with a glass lid. The slide or receptacle should be properly labelled with name of sheep owner, place where sheep were examined and the date.

Brief Description of the Parasite.

The *Psoroptes communis* var. *ovis* belongs to the Class Arachnida ; Order Acari ; Sub-order Sarcoptoidea ; Family Sarcoptidae.

It is commonly called the mite of sheep scab.

The mature mites (Figs. 1 and 2) measure $1/40$ to $1/50$ of an inch and the female is somewhat larger. The mites can be seen with the naked eye and in the majority of cases encountered by the writer he is able to pick up the parasites from the lesions with a pin aided occasionally by using a small hand lens.



FIG. 1.—*Psoroptes communis* (var. *ovis*).
Adult Male. $\times 70$.

The adults have four pairs of legs, visible from above as they project from the sides of the body.

A stalk and sucker are found on the first, second and third pair of legs in the male and on first, second and fourth pair of legs in the female. The stalk is long and three-jointed.

The eggs (Fig. 3) measure about $1/125$ of an inch and in Great Britain it has been found that the usual number

laid by each female is 15. In South Africa, however, it is recorded that the number laid is 80.

When egg laying is completed, the parasite dies.

Life History of the Acarus.

This is of the greatest importance as it is the basis of the present efforts directed towards the eradication of the scourge. The eggs are usually hatched outside the body of the acarus. Occasionally a specimen (Fig. 4) is encountered in which an apparently fully formed larva can be seen inside the female. Two eggs are commonly carried by the female at one time and sometimes one or three (Figs. 5 and 6).

The eggs hatch in from two to five days.

The larvæ (Fig. 3) feed and moult into nymphæ—time occupied, four days.

The nymphæ (Fig. 7) have 8 legs and suckers on the first, second and fourth pair of legs but have no mating tubercles at the posterior part of the body.

The nymphæ moult into the stage of pubescent female or male—time occupied, four days.

After mating, the females moult to the stage of ovigerous females—time occupied, about two days.

The time occupied by the life cycle under ordinary conditions is about ten days, with slight variations either way, but delayed breeding and progression must be reckoned with in practice.

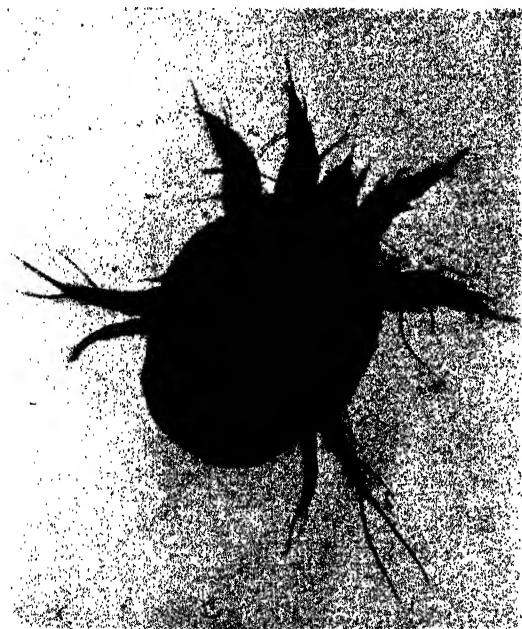


FIG. 2.—*Psoroptes communis* (var. *ovis*). Adult Female. $\times 70$.

For measures of control and eradication, the basic period of the cycle is not considered from egg to fully developed adult female but egg to egg, thus another two days may safely be added to the cycle when legislation is designed to prevent egg laying.

The males continue to live after they have fertilised the females. Very much of the research into the life cycle has been carried out by Mr. A. H. Berry, F.R.C.V.S.

(Ministry of Agriculture and Fisheries, London), the late Sir Stewart Stockman and the late Mr. A. W. Shilston, M.R.C.V.S.

The acari have been found to remain alive off the sheep for a month to six weeks at the longest, but most of them die before this time. Most of the eggs are said to hatch in a few days and there are records of eggs having hatched two and even four weeks after removal from the sheep.

Present-day Legislation.

The Sheep Scab Order of 1928 and a short Amendment Order of 1928 are the sole Orders pertaining to sheep scab in Great Britain. These Orders require to be carefully studied as they are based on sound scientific evidence.

Many agitators against the policy of eradication that is being pursued have not read the Orders carefully and one frequently sees suggestions offered that are already embodied and have been for several years.

The average stock-owner and his servants devote little time to the study of law. On the other hand, dealers do so and are ready to detect any weaknesses.

A strict enforcement of the Orders mentioned with those pertaining to the importation of sheep from Ireland, The Channel Islands and Isle of Man are sufficient for the complete control and ultimate eradication of the condition.

The double dipping of affected sheep and sheep that have been exposed to infection is prescribed.

This term is defined as "*dipping twice, the second dipping taking place not earlier than the eighth day and not later than the fourteenth day after the date of the first dipping (excluding that date).*" The dippings are required to be carried out in the presence of an Inspector:

The Minister of Agriculture also points out in a Circular Letter to Local Authorities "*if an approved sheep dip which contains arsenic is used for the second of a statutory double dipping, and a similar dip has been used for the first dipping, the second dipping should not take place earlier than the tenth day after the first dipping.*"

It is thus seen that the policy of double dipping has been followed after a careful study of the life history of the parasite. No sheep dip (notwithstanding the claims of advertisers) is known that will destroy the eggs without doing very much damage to the skin.

Educational Campaign.

In order to dispel many deep-rooted misconceptions, an illustrated lecture is of great assistance in any district where sheep scab has been confirmed. The Minister of Agriculture informs stock-owners that the services of Veterinary Inspectors are available for giving such lectures in English, Welsh or Gaelic. The writer has delivered many lectures and has had large and enthusiastic audiences and has always encouraged criticism.

Frequently from the nature of the questions asked, one can learn that there is room for enlightenment of owners and their servants.

Education, however, would be useless if confined to giving addresses. Owners and shepherds should be shown the acarus on affected sheep and after its removal. By so doing, their interest is aroused and one



FIG 3—*Psoroptes communis* (var. *ovis*)
Eggs and larva $\times 30$



FIG 4—*Psoroptes communis* (var. *ovis*)
Adult female containing mature larva
unborn $\times 70$

can recall many instances where the examination of the parasite has given the necessary fillip towards the speedy destruction of the parasites.

It has been truly said, that British workmen are the best in the world. Shepherds know very much sheeplore and seem anxious to learn. They are intensely shy and conservative and may be inclined to listen to scientific facts with a fair amount of scepticism.

Within the past six months the writer had an interesting interview with a shepherd aged 75 years who had never seen or heard of the acarus of sheep scab. His master had bought some sheep and sheep scab came with them. Without demur he guided the Officers of the Local Authority and myself to the hill where the scabby sheep were and one was caught for inspection.

With little difficulty a good specimen of an adult acarus was picked up from a lesion on the buttock and the shepherd was handed the specimen. In answer to questions aimed at

testing his powers of observation he correctly stated the number of legs and mentioned that the parasite seemed to have a red cravat

round its neck. The shepherd appeared very interested and was told a few interesting facts concerning the Biblical reference to sheep scab, the minute anatomy of the parasites, and it was pointed out that double dipping if properly done would stamp out the complaint. The shepherd absorbed all like a sponge does water and in a few days' time sent some very clever poetry on sheep scab to the writer who replied to him also in verse. It is only fair to mention that this veteran shepherd told the Local Authority Veterinary Inspector that the writer might know a little about sheep scab but he did not know how to write poetry. Thirty minutes spent with a man of this type does very much good as he will undoubtedly pass on the information obtained to others, including his master.

Veterinary Surgeons can do much to assist by explaining to owners, shepherds and police officers the nature of the condition and the importance of careful dipping and the reason for what might be termed "the long period of incubation."

Many protests are lodged every year against the double dipping of sheep that are considered to have had contact with affected ones during the period of six months previous to the confirmation of the outbreak.

The Veterinary Inspector too infrequently assists the Inspector with facts concerning the advisability of tracing certain lots.

There has been good reason for protests in many instances and perusal of the Sheep Scab Order of 1928 will show an effort has been made to minimise such complaints as on the isolation notice (Form C) and Dipping notice (Form E), the reasons for service of the notices have to be stated.

The Veterinary Inspector is required to give directions in writing regarding the treatment of affected sheep.

He should explain that two dippings within the prescribed period are not always successful in curing the condition.

The writer has experience of sheep having been dipped 11 times before he could definitely say that freedom could be safely granted.

Education of police officers regarding the necessary correspondence that passes to other Local Authorities is a necessity. Such correspondence in a short time becomes very intricate but much trouble could be saved if in the first instance the ear, horn, or other distinguishing marks of the sheep that require to be traced were furnished.

Some Local Authorities are in the habit of failing to reply to such correspondence. Occasionally one meets a Chief Constable who requires a complete report of the outbreak and the ramifications of the tracings. The writer has read many of these lucid reports with very much interest and realises full well the amount of time spent in their

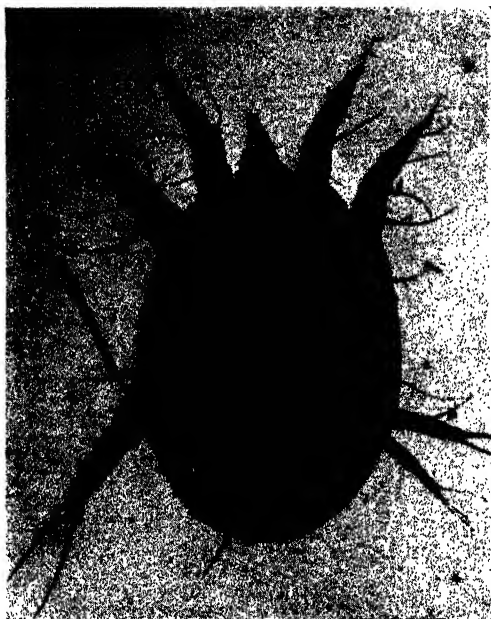


FIG. 5.—*Psoroptes communis* (var. *ovis*). *Adult female. Containing egg.* $\times 80$.

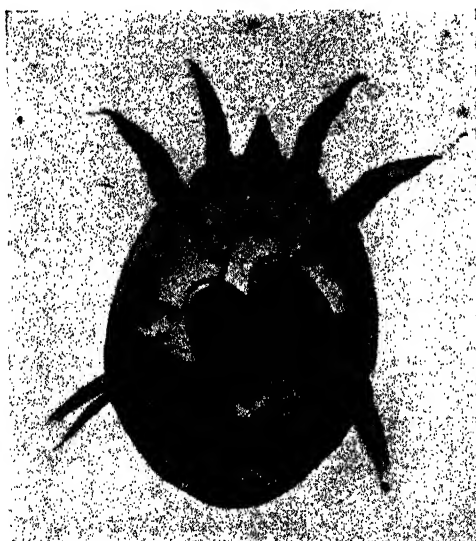


FIG. 6.—*Psoroptes communis* (var. *ovis*). *Adult female. Containing 3 eggs.* $\times 80$.

preparation. Each Local Authority would be well advised to ask for such reports to be furnished by the Chief Inspector.

The reports could be presented to Committees and the members would then see that efforts were being made to stamp out sheep scab.

Research workers have still much information to supply to those engaged in the work of eradication.

Portable outfits for testing sheep dips are in use in some countries but seldom seen in Great Britain.

Information regarding the acaricidal value of some of the sheep dips on the market would be welcomed and facts concerning the wetting power, penetrability and toxicity should also be ascertained. The writer is fully aware of the literature that exists on such research but regrets that it has not found its way into publications usually read by Veterinary Surgeons.

Agricultural colleges could do more than they do by ascertaining the best methods of breaking hard waters for use in mixing dips. Much damage to the eyes of sheep has been encountered by the injudicious use of water softeners.

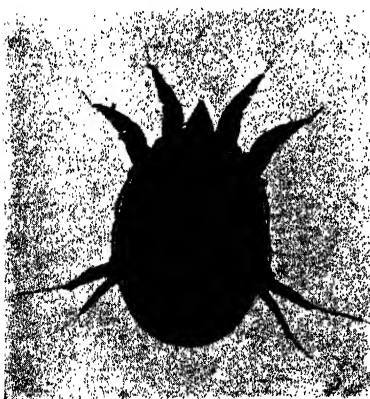


FIG. 7.—*Psoroptes communis* (var. *ovis*). *Nymph.* $\times 100$.

Local Authorities might be asked to provide proper dipping places and charge for their use and thus use their statutory powers.

There are "worlds still to conquer" in connection with the eradication of sheep scab, but the writer is convinced that each difficulty can be overcome by the display of personal as opposed to material capital. By personal capital is understood the skill, ability, genius and disposition of the individual—capital which is owned to some extent by every-

one connected with agriculture. Indifference and apathy require to be eliminated and optimism, vigorous and sustained endeavours substituted. May each and all of us who possess veterinary qualifications "do our bit" towards rendering assistance and when the day comes for historians to write of the complete suppression of sheep scab, may they be able (and not forget to do so) to point out that the Veterinary Profession was untiring in its efforts and rendered the greatest possible assistance.

Team work is essential and continuous pursuit obligatory.

For the loan of the blocks used to illustrate this article, the writer expresses grateful thanks to the Highland and Agricultural Society of Scotland. They were used to illustrate an informative article on "Sheep Scab," by the late Sir Stewart Stockman, which appeared in the "Transactions" of the Society in 1925.

Clinical Articles

Ulcerative Dermatitis of Pigs Associated with Presence of *Treponema* in the Lesions.

By DUDLEY A. GILL, M.R.C.V.S.,

Government Veterinary Officer, New Zealand.

IN the literature available in New Zealand there is only scanty reference to this condition. Huttyra and Marek (1) state that Dodd, working in Pretoria, found a spirochaete (*Spirochaete Suilla*) connected with superficial ulcers extending over the entire body surface of young pigs; and that he succeeded in transmitting the disease to healthy hogs by rubbing material from ulcers into scarifications of the skin. They also state that Cleland in West Australia found a similar parasite in the fibrous nodules occurring in castration wounds of hogs; and Gilruth found them in submucous cysts of the large intestine. Matteo found a spirochaete causing a severe affection of hogs in the lowlands of Erythraea. Hoare (2) mentions the same facts at slightly greater length and in his final paragraph on the subject appears doubtful as to whether these conditions are actually due to the spirochaetes found in the lesions.

Necrotic ulcers are fairly commonly met with on young pigs in this country, but in March of 1928 some specimens were forwarded to this Laboratory in which *B. necrophorus* could not be found, while a spirochaetal organism was observed in large numbers. The conclusion was formed that we were dealing with the same condition which Dodd and Cleland had described.

This year, particularly in one district, there have been a number of outbreaks of similar nature (no *B. necrophorus* but numerous spirochaetes in the lesions) and from information gathered indirectly it seems that considerably more of it has occurred in other districts than has actually been reported.

The writer visited the area from which most reports were received with a view to gathering first hand information, and some of the facts

about the cases were interesting. The following are brief notes on three occurrences :—

B—— bought 16 pigs in October at a local Saleyard. After they had been on his farm for about 8 weeks a slight rash appeared on them. Some of these lesions subsequently developed into ulcers. Seven of the 16 were so badly affected that he destroyed them (specimens from this outbreak were examined at the Laboratory). Three others were given local treatment with copper sulphate by the owner, and eventually recovered. None of his own pigs ever showed any signs of it but whereas the bought-in pigs were housed in wooden sties from which there was no drainage, and which consequently were in a horribly insanitary condition, his own were running out in quite good pig-paddocks.

C—— had a few affected last year. At that time a particularly dirty sump, filled with effluent from the pig sties, was not fenced off in any way, and the pigs had free access to it. This year he has the sump fenced in. About a dozen have been affected and in all but three or four instances it has been on the scrotum after castration. One of the exceptions, showing a large ulcer on each side of the neck and one on the right forehead, was forwarded to the Laboratory as a source of fresh material. It was obviously unwell, but showed no symptoms suggesting any definite disorder and it was a surprise to find it dead on the third morning after its arrival. *Post-mortem* examination was still further surprising as it showed very extensive and typical lesions of Pasteurellosis (confirmed by animal inoculation). This will be mentioned again later. Unfortunately it was found that the ulcerative condition was in an advanced stage of healing.

L—— had several cases two years ago which he believes were the same. Last year had few, if any. This season has had a dozen or more. He killed several, two or three recovered. On looking round his pigs we found three more cases. Of these two showed rather unusual lesions. There was a small external wound on the ear suggesting a tooth mark, or a slight tear with barbed wire, and from this the infection had burrowed inward between the layers of the external ear, causing marked swelling resembling at first sight, that seen in the case of hæmatoma of the ear in dogs. As the owner wished it, both these pigs were killed, but no other lesions of any note were discovered at *post-mortem*. The third affected pig showed a lesion over the right eye, about two inches across, with necrosed edges and in the centre showing the bony structures which were commencing to slough off in large flakes. It also showed an extensive lesion below the right elbow. This pig, unlike the other two, was doing badly though it showed no definite symptoms. On *post-mortem* the same extensive and typical Pasteur-

ellosis lesions were found as in the pig mentioned above which died at the Laboratory. The pig pens and sties in this case were old and in poor order generally, and there was a dirty mud pool in one part, used by the pigs as a wallow.

Specimens derived from these three outbreaks were examined microscopically and showed conclusively, to my mind, that the condition was not due to invasion by *B. necrophorus* as organisms bearing a morphological resemblance to this type could not be found. On the other hand spirochaetes or perhaps, from the situation, it would be more correct to call them *treponema*, were consistently present, and moreover while few were seen in smears from the surface of the lesions, if a preparation was made from about the junction of the necrosed tissue with the reactionary fibrous tissue zone, they were seen to be present in considerably greater numbers, though by no means unmixed with various other organisms.

In connection with the staining of these organisms Fontana's method gave the best results, Chinese ink was not quite so good. In the routine examination of pathological specimens one would not, of course, apply these methods, some more ordinary stain would be used, and it is of interest to note in passing that whereas in unpreserved material these stains left the *treponemas* almost entirely unstained, yet if 5-10% formalin had been used as a preservative each of them showed the *treponema* up faintly but nevertheless unmistakably. Possibly this may explain why these organisms have not been found more frequently, and probably a further reason is that the resemblance of the lesions to those of *necrobacillosis* is so close that no doubt it has often been diagnosed as such in the field without recourse to microscopical examination at all.

Whether these *treponemas* are the actual cause of the lesions is doubtful. An attempt was made to transmit the condition to a young, healthy pig by rubbing material, shown microscopically to be rich in *treponemas*, into scarifications of the skin, two sites being thus treated. Nothing in the nature of an ulcer resulted and in a week the two sites were almost indistinguishable from the surrounding healthy skin. In addition an effort was made to pass the condition on to a rabbit. A portion of skin was clipped away at the base of one ear and the resulting wound heavily inoculated with material from an ulcer, and further, a heavy emulsion of similar material was made in normal saline and $\frac{1}{2}$ cc. injected subcutaneously. The result in each case was entirely negative.

As stated above it was found in examining these ulcers that the

number of treponema was much greater in the depths of the lesions but that even here they were not by any means alone. In sections, prepared according to Levaditis' method for spirochaetes, it was found that at the junction of the diseased and reactionary tissues, while treponema were fairly numerous other organisms, in great variety, were present in even greater numbers so that from that point of view they themselves might with more reason be held responsible. According to Wenyon in Tropical Ulcer of human beings (3), where treponema schaudinni is found in practically pure culture in the depths of the lesions, grave doubts are nevertheless held as to its etiological significance. Organism, of this type are commonly present in the intestinal tract of animals, including pigs, they are frequently present in water, soil, sewage, and, in fact, have a very wide range of existence as saprophytes, so that it would not be unexpected if damaged tissues, with various other organisms present to assist in making conditions of aerobiosis suitable, were to provide an extremely favourable breeding ground for them. No doubt when they have gained a footing in a lesion and are living and multiplying in it their presence, as it were, adds fuel to the fire, but it seems improbable that they have any more direct significance than other admittedly saprophytic types which are well known to flourish under like conditions. It is suggestive that in each of the three outbreaks instanced above there was evidence (1) that skin wounds or other lesions had preceded the trouble, and (2) that conditions in the sties and surroundings were such that one might reasonably expect organisms of the spirochaete class to be present in large numbers.

The case of treponema podovis, postulated recently by Messrs. Ludoric and Pierre Blazit as the pathogenic cause of a form of footrot among sheep in certain districts of France (4) seems to the writer to be equally one of "not proven." Their suggestion, that the excellent effect which intravenous novarsenobenzol had upon the lesions is proof of the treponema being causative, does not appeal very strongly in view of the well-known effect which organic arsenic preparations have upon concurrent staphylococcal and other lesions when used in the treatment of syphilis in the human subject.

The frequency with which pigs that have died while affected with this condition, or whose health has appeared so poor that the owners have killed them, have shown extensive lesions in the lungs and pleura is rather striking. Two cases are instanced above and many others were encountered by the Stock Inspector in whose district the investigation was made. Probably secondary infection following upon lowered powers of resistance is, broadly speaking, the explanation, but one cannot help wondering whether the ulcerative condition itself may not

have its origin in lowered resistance. In this country owing to the high cost of concentrates, etc., it is the usual practice for pigs to receive very little except heavily skimmed milk, with or without a certain amount of grazing, and one has often been surprised when observing conditions of feeding and environment out here, why there is not considerably more loss from various diseases than there is.

Except where secondary infection occurs, or there is mechanical interference preventing the animal getting its proper share of food, the lesions do not appear to cause any noticeable illness, and if taken in hand early and thoroughly cleaned up they are not particularly refractory.

SUMMARY. 1. When ulcers on the body surface of pigs are found associated with the presence of treponemas and other organisms it appears likely that the former are actually saprophytes, but find conditions in the damaged tissues highly favourable and therefore multiply there. 2. The body may allow the presence of these and associated organisms because its powers of resistance being lowered, it is unable to evict them. 3. From this it would seem that adequate means of prevention are to be found in the adoption of such feeding practice as will tend to maintain bodily resistance at a high level, and adequate sanitation, so that the pigs' environment is not such as to result in prompt and heavy contamination of any slight superficial wound.

LITERATURE CITED.

- (1) Hutyra & Marek's "Special Path. : & Ther."; Vol. 1, page 1079.
 - (2) Wallis Hoare's "System of Vety."; Medicine Vol. 1, page 1238.
 - (3) Wenyon's "Protozoology "; Vol. 2, page 1270.
 - (4) Translation by Dunlop Young, *Vety. Record*, 2.2.29.
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"Equine Contagious Pleuro-Pneumonia" (Paddock Fever).

By MAJOR H. ALLEN, O.B.E., R.A.V.C.,

Remount Depot, Mona, Punjab, India.

Introduction.

"PADDOCK FEVER" adequately expresses the conditions existing in Mona Remount Depot.

Reviewing the subject, influenza (pink eye), contagious equine pleuro-pneumonia, infectious anæmia, strangles, horse-sickness, and purpura hæmorrhagica have many points in common, although clinically they may show great differences. With regard to some of these clinical teaching has been wrong, as not a few are of a polymorphic type.

"Influenza."

When using the name in the Veterinary world we are associating it with human influenza, but the latter is more like contagious equine pleuro-pneumonia.

The French designate "Pink-eye" as a typhoid fever (*fièvre typhoïde*), but it is absolutely distinct from human typhoid fever. Etiologically it has the merit, however, that it does not give rise to any analogy with the human disease in our minds.

Influenza and contagious equine pleuro-pneumonia have been confused in Veterinary literature, which may be due to German teaching (*Dieckerhoff*) which made the following classifications:—

Influenza catarrhalis (pink-eye).

Influenza pectoralis (contagious equine pleuro-pneumonia).

It also classified an infectious cough, laryngitis and a nasal catarrh, but we now consider that these are not infectious diseases.

The work done on the subject in Holland is so far the best.

Koch in 1900 was commissioned to investigate the disease and on his death was succeeded by Gaffke, and Hutyrá and Marek as a result give a rather confused idea about the subject.

Influenza and contagious equine pleuro-pneumonia were included until lately as a single disease, in two different forms, but influenza is due to an ultra-visible virus and is transmissible by blood injections (*Berkefeld* filtered blood-serum), and other body fluids, but contagious equine pleuro-pneumonia has so far not been transmitted in this way.

Gaffke says that he has transmitted it by feeding tracheal and bronchial washings at an early stage of the disease; but this has not been verified. *Bemelmans* (Holland) failed to transmit it in the above or any other way. Influenza is easily transmitted artificially, whereas

contagious equine pleuro-pneumonia is not transmissible under natural circumstances by direct contact. The semen of some stallions is infective in influenza (Poels). A Roumanian worker (Vechin) has shown that the saliva and pleuritic fluid are infective, as well as the contents of those cysts sometimes formed in the parotid glands, after an attack of influenza. He also found that recovered animals were infective up to 5-6 months after recovery.

Influenza is a highly diffusible disease and spreads alarmingly in intensity within a few weeks, but contagious equine pleuro-pneumonia exhibits quite a different set of properties of the causal agent.

Schutz in 1887 said he found Streptococci in the lungs and it has been held to be the cause of the disease by many workers. Some French workers claimed a Pasteurella as the cause. Pasteur found a Pasteurella in an outbreak amongst horses in Paris, and Lignières said the same as Pasteur ; but Pasteur never claimed it to be the cause. Lignières said that a Pasteurella was the initial cause and that Streptococci were invaders. German workers have claimed that they have found a Pasteurella in the lungs. Pasteurella were never found in the lungs in England, but have been found in the nostrils.

It is now quite clear that Pasteurellæ have nothing to do with the disease, nor with the secondary lesions. This has been confirmed by some German workers.

Streptococci have nothing to do with the disease for the following reasons :—

(a) In early cases of the disease which die, no Streptococci are cultivatable from the lung lesions, and only intense congestion of the lungs is seen. They may be found in the upper respiratory tract, but they do not cause a fatal course from this locality.

(b) In actual outbreaks when animals are exposed to infection, and careful observations made upon those showing clinical symptoms of pneumonia, we find that a large percentage of other animals contract the disease which is not manifested by pneumonia.

General Outline of Symptoms.

The disease is in fact initially one characterised by high fever and an intense auto-intoxication of centres of the medulla, notably the respiratory and Vaso-motor centres, which causes a more or less intense derangement of the nervous system, and blood vessels, including those of the lungs in particular.

The auto-intoxication causes the lungs to become a highly vulnerable tissue, and a veritable incubator for micro-organisms. The changes produced primarily may cause death, with establishment of lesions, of what we call equine pneumonia.

During life clinical observations of such an acute case would lead one to think that it was acute pneumonia, and on *post-mortem* no well established lesions would be revealed. The Streptococci must therefore gain access to the damaged lungs, in particular to the spaces formed by transfusion, by wandering down the bronchi or via the blood stream. The lungs would then become a predilection site for Streptococci. Histological examination would prove that the Streptococci reached the lungs by the blood stream.

Examined at an early stage one finds in the lungs multiple centres established in the final divisions of the bronchi, in separate alveoli, and at some distance from each other. You may get separate centres of invasion, and a tendency to prompt necrosis and gangrene when coalescing. Pneumonia may be complicated with pleurisy with large quantities of pleuritic effusion.

In the early stage before streptococcal invasion takes place there is much pleuritic effusion, which is a sign of damage to the blood vessels underlying the pleura. Pleuritic fluid would be favourable for Streptococci if they did find their way into it.

The period of incubation is said by some workers to be about twenty days, but it is difficult to say. In my opinion it is about four or five weeks (Allen).

First of all there is a fairly rapid rise of temperature, 102° to 105° , which drops to normal by lysis on the third morning. Some cases take five to seven days to become normal. If the temperature goes up again after the third day, in all probability pneumonia will supervene.

Pleurisy in other cases necessitating immediate "tapping" may occur on the seventh or eighth day. Temperature "flares" occur from the seventh to ninth day, six days in some cases, and drop to normal by lysis on or about the seventeenth day. Some cases become normal on the tenth or eleventh day. The early "larval" stage is often passed unobserved, and the disease is only noticed when it has set in. During the early stage you usually get certain well marked symptoms which vary in intensity.

Nervous symptoms predominate, tremors, general stiffness, increased respiration, bounding heart beat, and thread-like pulse; which are due to the effect of the virus on the vaso-motor system, thereby causing constriction of the arterioles. Sometimes there is a more or less obvious discharge from the nostril of a rusty brown colour, but this is not constant. Tongue may be hot, and swollen conjunctival mucous membranes are cyanosed and of a leaden colour in some cases.

Patches of localised swelling under the sternum and belly and swelling of the legs. Dropping out of the hair at places, and later becoming badger-brush in appearance, has been noted by some writers.

Intestines may be damaged with hæmorrhage into the alimentary tract.

It has been observed that one may introduce a horse showing marked symptoms of pneumonia and the disease is not transmissible, but it has been found that a month afterwards it may start an outbreak of pneumonia. When the disease is severe in a locality (depot charge) in two places (Paddocks) or more, intervening places (Paddocks) escape. This is true of what happens in Mona Depot in the different charges. One charge may be affected and the others (four) remain free of the disease.

As regards the spreading of equine contagious pleuro-pneumonia, it is said to be quite easy to set up outbreaks by keeping animals in ill-ventilated stables, or under bad hygienic conditions. It is commonly seen amongst young stock, and when climatic conditions are adverse.

The train of symptoms in influenza and contagious pleuro-pneumonia are not dissimilar, but the injury is caused in influenza by the virus in the blood stream, setting up damage to the reticulo-endothelium, as in the case of rinderpest in cattle.

The virus in influenza circulates and has not such a profound effect on the medulla as in the case of contagious pleuro-pneumonia.

Influenza symptoms are those of great depression. There may be bowel trouble, or skin trouble. Conjunctival visible mucous membranes are a mahogany or brick-red colour. Eyelids swollen, etc.

In neglected cases you get pneumonia. Mortality is low. Horses which recover from influenza are resistant to further attacks, and may be carriers for many years, but this is obscure as regards contagious pleuro-pneumonia.

In Germany out of 46,000 cases of contagious pleuro-pneumonia only 4% contracted the disease again.

In England, 'bus horses which had an attack contracted it two years later, and then only lightly. My experience points to the fact that there is a relative immunity in the majority of cases.

On a total of 2,063 animals the numbers affected were 348 of these, 10 or 2.9% were affected twice, and 338 had only one attack.

These figures therefore show the liability to the disease once as being 16.3% ; and the percentage of liability of the disease as 48% of the total strength of stock.

Equine Contagious Pleuro-Pneumonia and Influenza Animals.

There is a difference but a similarity between influenza and contagious pleuro-pneumonia. You could call both diseases influenza if you had influenza of man in your mind's-eye, but it is the latter that has the greatest resemblance to human influenza and transmissibility is very similar to that of human influenza.

In human influenza the disease was thought to be due to the Pfeiffer bacillus (1892), but it is now said to have very little to do with the disease, as you only find it in 5% of unattacked cases in the respiratory tracts and you do not get it in actual cases. In the human you get the pneumococcus (Mather's coccus which resembles type IV pneumococcus morphologically, but is not bile-soluble) as a secondary invader.

A Dutch worker has stressed the close relationship between contagious pleuro-pneumonia and human influenza. The consensus of authoritative opinion points in the direction of equine contagious pleuro-pneumonia having a similar if not an identical, etiological origin to equine influenza, namely, an ultra-visible virus, and the streptococci found in the lung lesions (and which probably set up the actual lesions) being merely secondary invaders.

If this view is correct, therefore it is not impossible that a tardy recurrence of equine influenza may be manifested in an outbreak in which the secondary invaders are dominant.

In so-called contagious pleuro-pneumonia the mode of transmission is difficult to establish.

The Germans failed to demonstrate transmission by insects.

Can diseases of the variety of equine influenza and equine contagious pleuro-pneumonia be kept alive for several years in a locality and then change their clinical type when they reappear?

There is a mass of evidence to show that equine influenza can be kept alive for very many years in carriers.

Complications of Contagious Equine Pleuro-Pneumonia.

Damage to the nervous system such as the recurrent laryngeal nerve causing "roaring." Iritis is sometimes seen. A lesion which is sometimes set up is an endocarditis.

Abortion in pregnant mares. Laminitis is said to occur in some cases. Adhesions between lungs and pleura. Marked wasting, and general unthriftiness. Joint troubles—arthritis, and tendo-synovitis of the fetlock joints as sequels, ~~three~~ weeks as a rule, after convalescence. A few cases in which the tendon and tendon sheaths of the extremities are effected, particularly the flexor tendons and large sesamoidean ligament.

Some horses have two attacks, others three, but the vast majority only one attack.

Prophylactic control measures as adopted in Mona Remount Depot.

1. A separate hospital for wounds and lame cases.
2. Periodical disinfection of all water troughs in the various charges (5) and hospitals (8) twice weekly.

3. Special attention is paid to floors, mangers, buckets and hospital standings which have been occupied by cases. All cases are watered separately.

4. The limitation of movement of stock from one charge to another as far as possible.

5. Recovered "aborted" cases remain convalescent in hospital for two weeks; pleuro-pneumonia cases three weeks.

6. Cases which have had serious complications such as pleuro-pneumonia and pneumonia only may be "carriers" for a long period and are segregated after discharge from hospital for three months, and cases of the abortive type of the disease are segregated for six weeks in small paddocks, in order to restrict their galloping propensities and reduce the number of tendo-synovitis cases as a sequel.

7. All excreta, fodder, and bedding of cases in hospital and segregation convalescent paddocks are incinerated.

8. An early isolation of cases is recommended as the disease is not diffusible and it only spreads when there is a local congestion of equines.

The disease proper is not a pneumonia but it is a complication and therefore it is important to control the primary disease, i.e. fever and nervous prostration.

The virus appears to be more fragile than in influenza (can live for two months), and dies off quickly. It is analogous to that of foot-and-mouth disease which is a fragile virus, and to that of rinderpest. The rational control is very similar to foot-and-mouth disease and rinderpest.

The main controlling point in the disease in Mona Depot is that nearly all the horses live chiefly in open paddocks.

To detect early cases the taking of daily temperatures of some thousands of animals is naturally an impossibility.

Mona Remount Depot Summary Observations.

The attached table shows at a glance the number of cases during 1926, 1927, 1928 and 1929 to date of compilation of this article, and the occurrence month by month.

There have been 649 cases from January, 1926 to March, 1929.

The disease skips many animals in the same paddocks, and similarly paddocks remain free, pointing to the fact that some unknown intermediate exists, and a possibility of having to deal with a virus carrier.

It always spreads in an irregular manner throughout the depot and cases occur during the non-fly biting season.

Catarrh in majority of the cases is conspicuous by its absence.

A rusty discharge has been noticed in some of the cases of pneumonia.

pleuritic exudate after a "tapping" is preserved by adding 10 c.c. of carbolic acid solution 5% to every 90 c.c. of the fluid, stirred up and kept for two or three days; but when more exudate is obtainable the previous days is discharged and similarly treated as above. As a rule I perform thoracentesis on the following day.

When cord-like masses of fibrin are present the exudate is allowed to settle before injecting.

There is an improvement and as a rule the temperature drops to normal after the third injection.

Counter-irritation to the chest walls is not resorted to.

The colour of the pleural effusion varies in the different cases—pale yellow, yellow with a reddish tinge, brownish, dark brown, and in one case it was of a decided greenish hue.

All the pneumonia cases are treated with 2½% carbolic solution in one pint normal saline solution, the dose is increased daily by 10 c.c. until improvement sets in and the temperature becomes normal.

I have not been afforded the opportunity of giving salvarsan or neosalvarsan a trial.

Continental workers say that with these drugs there is a marked rise of temperature from the third to the ninth hour—two degrees or more—and then a sudden lysis occurs, after which the patient seems to be restored to health very quickly.

The dose recommended is .01 gramme per kilogram body weight.

Some workers say that the bactericidal action of salvarsan lasts for only a short time, and reaches its maximum about one hour after injection and that the animal loses condition after the use of the drug.

REFERENCES.

- (1) Miessner H., "Epizootics and their control during War," 1917.
- (2) Hutyra and Marek, "Pathology and Therapeutics of Diseases of the Domesticated Animals," Vol. I, 1926.
- (3) Hoare, E. Wallis, "A System of Veterinary Medicine," Vol. I, 1915.
- (4) Law, J., *Veterinary Medicaire*, Vol. IV, 1906.
- (5) Malkmus, Dr. (Hanover), "Contagious Equine Pneumonia," *Journal Comp. Path. and Therap.*, Vol. XXII, No. 2, 1909.
- (6) Webb, E. C., "Bi-polar Staining bacilli of the Fowl-cholera type as the cause of widespread and fatal Pneumonia in Horse and Donkey Stock in India," *Journal Comp. Path. and Therap.*, Vol. XXII, No. 2, June 30th, 1909.
- (7) Vechine, Al., "Equine Influenza (pink-eye)," *Journal Comp. Path. and Therap.*, Vol. XI, Part 8, September, 1927.
- (8) Greig, "Serum treatment of Shipping-Fever and Pneumonia." British Remount Commission in America, *Veterinary Record*, 15th July, 1922.
- (9) Lentz, W. J., "An Experience with different treatments for 'Shipping-Fever' in a Sales Stable," *Journal American Vety. Med. Assoc.*, Vol. LI, May, 1927.
- (10) Edwards, J. T., Review of subject. Verbatim notes and comments taken and recorded by me at Post-Graduate Course Imp. Lab. of Vety. Research, Muktesar, India, 1928.

Tuberculosis as Meant by the Tuberculosis Order.

By T. W. HUGHES, M.R.C.V.S.,

Mold.

TUBERCULOSIS due to emaciation is sometimes difficult to detect. In my opinion the symptoms vary quite considerably and sometimes there is very little to go on except the wasting and the history of the case, which is most important. Rectal examinations are useful as are also auscultation sounds, but these latter need careful interpretation and summing up. Enlarged lymphatic glands aid diagnosis along with the other symptoms. In many cases a cough is not present, and most of the lesions are found in the abdominal cavity. When Jöhnes disease and tuberculosis exist in one and the same cow differentiation is difficult; I have had such cases. A lot of judgment is necessary to know if some of these reported *emaciation cases* are tuberculous as meant under the order. The thin cow with intermittent tympany is nearly always tuberculous and on *post-mortem* one finds enlarged uredrastinal and bronchial glands in these cases.

The microscope is the best method of diagnosing cases of chronic cough. Get a sample of sputum and examine it in the usual way. The microscope is invaluable for this and also for milk and glandular discharges. Doing your own examinations saves a lot of time and does away with a lot of guesswork.

Milk and Udder Cases.

If you can feel something clinically wrong with an udder you can always tell if you are dealing with tuberculous infection with the aid of a microscope. Centrifuge your sample well and stain in the usual way. Do not let one examination suffice if you are doubtful clinically. If you fail to find the bacilli with the microscope, it is necessary to have a biological test.

I have only once had a positive result from the laboratory when I have failed to detect the bacilli with the microscope and I have submitted some thirty-eight samples to laboratories at the request of the Local Authority.

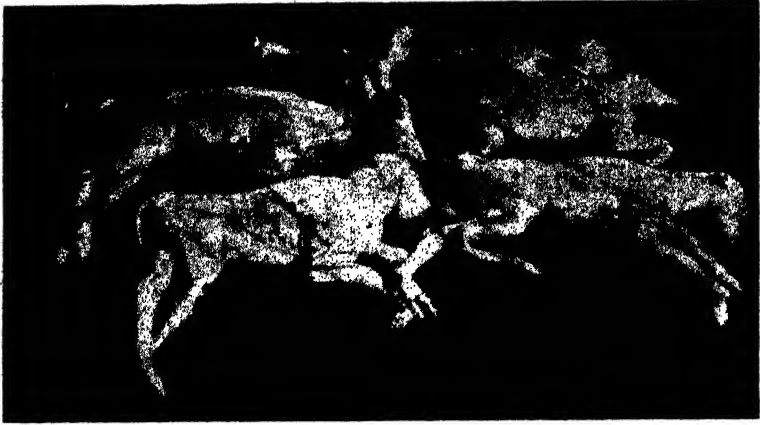
Six Calves at a Birth.

By E. J. LAINÉ, M.R.C.V.S.,

Guernsey.

Six calves, 3 male and 3 female were born to a cow in Alderney. The cow was named "Honeydew" and was in the Royal Alderney

Agricultural Society's Herd Book. She was 6 years old and calving for the third time. She belonged to Mr. Blondin, Little St. Alderney.



The cow was of very great size and had much difficulty in walking. She calved down at seven months, the calves being of normal size for this period.

Foreign Bodies in the Abomasum in Merino Sheep.

By R. PAINE, F.R.C.V.S.,

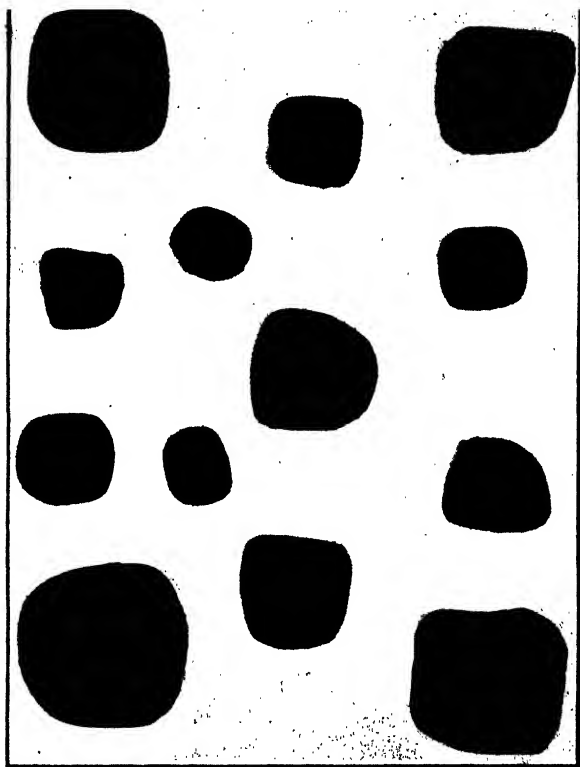
Grahamstown, Cape Province, S. Africa.

A FARMER complained that a number of his sheep were gradually losing condition, finally becoming so emaciated that they either died or had to be destroyed, that upon *post-mortem* examination the only abnormality was a number of foreign bodies in the fourth stomach.

The sheep were young full mouth grade cape and merino cross, reared on the farm, and within a few months eleven had died in a flock of three hundred.

Two sheep were sent to the Institute for observation purposes, one being *in extremis* was destroyed at once, and *post-mortem* examination revealed five bodies in the abomasum (ranging from 1½ inches square downwards) in a line directed towards the pylorus so as to cause actual obstruction, otherwise the organs were normal. The second sheep was

kept under observation for a further 16 days, and as it became gradually weaker it was destroyed, the examination revealed twelve similar squarish shaped bodies weighing 225 grammes (see photograph).



Foreign bodies taken from the abomasums of Merino Sheep.

A month later I visited the farm and opened a lamb which had died during the night, four similar bodies were present; the herd then picked out two other sheep which he suspected of the same trouble, one was killed and revealed 17 bodies in the abomasum.

The Botanical Division of Rhodes University College very kindly reported upon the specimens, that they were of a vegetable nature, showing a cellulose reaction; no hair or animal material was present, nor could any nucleus be detected.

The veld appeared to be ordinary karro, and no strong clue could be obtained as to the causation, but a suspicion was raised by the fact that the sheep were receiving a lick containing large pieces of uncrushed sulphate of iron. Whether this drug in that state caused

impaired digestion, or whether it was a constitutional defect in the sheep could not be ascertained.

A large proportion of the young stock being apparently affected, and no curative treatment being possible, it seemed to be the soundest advice to dispose of the flock and restock with a new strain. Possibly some other observers may have encountered a similar condition and can throw some light on the question.

Intra-Thoracic Œsophageal Obstruction in the Dog.

By J. G. WRIGHT, F.R.C.V.S.,

Royal Veterinary College, London.

IN October last year in a paper presented to the Mid Wales and South Wales Veterinary Association, I described several cases of Œsophageal obstruction in the dog; and during the last few months several more cases have come to my notice.

Case 1.

A nine months Cocker Spaniel male. The symptoms, which were as follows, are typical and are quite diagnostic of Œsophageal obstruction in the thorax. The animal is hungry and will take food readily. Having swallowed a few pieces of meat, it is at once obviously distressed. He gulps and swallows saliva, arches his neck and draws the chin towards the sternum; in fact, shows that despite the fact that the meat has disappeared, it has not reached the stomach. This goes on for a period of 1 or 2 minutes (often longer, especially if the obstruction is of some days duration) and then vomition occurs, the meat being returned. Vomition causes the animal considerable distress, and if the obstruction is due to a sharp body, frequently blood is returned as the result of laceration of the Œsophagus.

Liquid will frequently pass the obstruction and is retained.

To confirm one's diagnosis X-ray photography may be resorted to. Results, however, may be disappointing. The foreign body, usually a piece of bone, may be cancellated tissue, in which case little or no shadow will be formed. Such was the case in the animal under discussion. No definite shadow could be seen.

The animal was narcotised with one grain of morphine sulphate and the probang carefully passed. One was unable to get beyond the fourth rib, and a diagnosis was made that the Œsophagus was obstructed by a piece of cancellated bone immediately over the heart.

It was decided to perform Œsophagotomy immediately anterior to the presternal cartilage and to endeavour, by passing a pair of

narrow jawed whelping forceps along the œsophagus into the chest, to grasp the offending article and withdraw it.

Operation.

The animal is anæstheticised with chloroform and placed in the dorsal position with head and neck extended. Having prepared the site an incision $1\frac{1}{2}$ " long is made in the middle line immediately in front of the presternal cartilage, through the skin and subcutaneous fat, immediately beneath lies the sterno-thyro-hyoideus, through which the incision is continued and the trachea exposed. The œsophagus is on the spinal aspect of the trachea and slightly to the left side. Into it a probang is passed, *via* the mouth, and then by palpation it can easily be recognised by a finger in the incision. The œsophagus is raised by means of a tenaculum and drawn into the operation wound. It is incised longitudinally.

By passing the index finger into this incision and along the œsophagus, the foreign body can be felt immediately over the heart and from $3-3\frac{1}{2}$ " behind the first pair of ribs.

The forceps are next introduced and, with considerable difficulty, the foreign body is grasped and drawn forward and removed.

The œsophageal, muscular and skin incisions are left open and for a few days a fistula occurs, milk which is swallowed passing out through it. Suppuration occurs for 2—3 days after which granulation rapidly occurs and healing is complete in about fourteen days.

The piece of bone (part of a sheep's vertebræ column) was jagged and irregular, its dimensions being $1\frac{1}{4}" \times \frac{3}{4}" \times \frac{1}{2}"$

Case 2.

A few days ago a 9 years old miniature cairn bitch was admitted to the College, showing symptoms identical with those previously described. An X-ray photograph showed quite plainly a foreign body obstructed in the œsophagus immediately over the heart and between the third and fourth ribs.

Vomition caused the ejection of a considerable quantity of blood and prognosis was therefore guarded.

Morph. gr. 1/6 was given subcutaneously ; the little bitch, however, died before the operation was commenced.

The operation, as previously described, was carried out as a demonstration to the students and the foreign body removed. Again a jagged piece of vertebral column, but the bone was more compact than in the previous case.

Discussion.

Practitioners must be constantly coming in contact with cases such as these, and as the great majority of them prove fatal I would suggest that something on these lines be carried out. I have seen a case in which a piece of bone was returned during vomition after having been obstructed in the œsophagus for fourteen days.

The subcutaneous injection of atropine (gr. 1/200—1/100) suggests itself with a view to causing relaxation of the œsophagus and this, together with the packing of some meat or other solid substance in front of the obstruction, might facilitate its vomition. At any rate, it is most probable that it would render its removal by forceps more simple.

I feel that in the second case described the vomition caused by the morphine was probably a contributory cause of the bitch's death, and think it would be better to use chloroform alone, in future.

A Curious Accident.

By R. E. ALEXANDER, M.R.C.V.S.,

Weymouth.

I WAS called in to see a half-bred Persian cat that had given birth to five kittens on the previous night. I was told that the cat's front paw on the near side had swollen to twice the natural size.

On examination, I found two normal kittens sucking milk from the mother, and three other kittens united by a very tough, common umbilical cord, twisted tightly round the parental foreleg.

The cord was buried deeply into the skin, causing the paw to swell enormously, and the kittens were fighting desperately to reach the milk depot, much to the discomfort of the unfortunate mother.

On cutting the cord, the cat had a luxurious stretch in the way that only felines can, and hobbled away with obvious relief, leaving me to separate the rest of the family. I ordered hot applications to be applied frequently to the foot, as in my experience gangrene starts more easily in the cat than any other animal.

Salt Poisoning in Fowls.

By G. MAYALL, M.R.C.V.S.

A MAIDSERVANT at a country cottage gave two pounds of salted runner beans (which had been cut up and preserved in salt in the usual

way) in the mash for the fowls. Within thirty-six hours twenty-four of the fowls were dead. The owner tasted the mash and states that it was just like brine itself. The fowls were given the mash in the morning and also fresh water. In the afternoon at 5 p.m. all the fowls were sitting round the water trough and passing green liquid motions. The water trough was quite empty, which was most unusual. Some fresh water was given and all the fowls that were able went for it ravenously, but there were fifteen that could not move at all, but just sat there as if on the nest. Their combs were very red, and crops much inflated (tympanitic). The fifteen were lifted into the cote, but one died at 6 p.m. the same night, and next morning nineteen were dead, and the following night four more died. They seemed paralysed, and drew their feet up and kept moving their heads about. Ten birds recovered after dosing with olive oil and arrowroot and milk.

Post-mortem showed intense redness and dryness of the muscular tissues, inflammation of the proventriculus and intestines, thickening of the blood, cedema of the lungs and congestion of the liver. A solution of the crop and gizzard contents gave a white precipitate with silver nitrate soluble in ammonium hydrate.

The fatal dose of salt is 4 to 4½ grammes of salt per kilogram of fowl. If it has access to water it can survive a bigger dose. Salt produces its injurious effect by abstraction of water from the tissues and by its irritating and inflammatory action on the mucosa of the digestive tube and its nerve paralysing poison. (DR. R. REINHARDT.).

Abstracts

University of London.

Abstract from the Report of the Principal on the Work of the University during the Year 1928-29.

EXAMINATIONS AND ADMISSIONS TO THE UNIVERSITY.

The statistics for the year under review are as follows :—The total admissions by all channels during 1928-29 amounted to 9,708, as compared with 3,852 in the last year before the War and 9,119 in 1927. Of these, 7,082 came in through the ordinary Matriculation Examination, 453 as graduates of other Universities, 1,147 as holders of the Oxford or the Cambridge School Examination Certificate, 767 as holders of other approved Certificates, and 259 after examination.

under Statute 116. The total number of candidates for all Examinations was 34,941, as against 11,937 in 1913 and 33,903 last year. The total number of successful candidates at all Examinations was 15,186, and of those who obtained Degrees and Diplomas 3,089, as compared respectively with 6,343 and 1,301 fifteen years ago and 14,102 and 3,030 last year.

BENEFACTIONS.

The grants from the Treasury and from the London County Council have been maintained. In addition, the Treasury have made special grants of £9,000 to the Imperial College for the extension of the Students' Union building and of £10,000 to the London School of Economics for the provision of further accommodation for the Library. That School has also received from the London County Council an equipment grant of £5,000 in respect of the building in Houghton Street and of the extension of the present School building.

Apart from the support given to us by public authorities we have received during the year valuable benefactions from other sources. The Cassel Trustees have extended for a further period of five years their grant of £800 a year for the maintenance of the University Chair of International Relations at the London School of Economics. The Incorporated Institute of British Decorators have guaranteed, for a period of three years in the first instance, the salary of a Lecturer in Decoration in connection with the Bartlett School of Architecture at University College. For the establishment at that College of a Scholarship for training in Physiology and Biochemistry the Senate have accepted with thanks the offer of a sum of £2,600 raised by the Committee of the Bayliss-Starling Memorial Fund.

Nearer home, one other item must not pass unnoticed. For the first time, excluding, of course, the War period, the strength of our Officers Training Corps has reached the thousand mark. This is a matter for congratulation to all concerned and not least, I think, to the Officer Commanding the Corps, who, in the more peaceful paths of academic life, is not unknown to us as Prof. Filon and to whose activities has now been added the Directorship of the new University Observatory at Mill Hill Park. The Observatory, in which is housed the Wilson Telescope, will shortly be opened formally.

Last year I brought this section of my Report to a close with a reference to the medical education of women undergraduates in the University and I mentioned that a Committee of the Senate had already been set up to report on the question. The Committee held

eleven meetings, interviewed representatives of the Medical Schools and others interested, collected a great body of material bearing on the subject, and, in January of this year, made their Report to the Senate. The Committee, while setting out the various difficulties and problems which had been put to them, stated that they were unable to see any valid argument on the merits against the provision of co-education in medicine. The Report has been published and, though I need not therefore go into any detail here, I feel that I may appropriately quote its concluding paragraph. This reads as follows:—
“Co-education, if it is to succeed, must be voluntary. Before the
“War the tradition or policy of the Medical Schools was opposed to
“co-education, and its introduction during the War was due to the
“initiative of the Schools, though it was welcomed by the University
“as being in accordance with its own policy. Its restoration can, we
“are convinced, only come about by an agreement between the
“University and the Schools and possibly by an arrangement by which
“the several Schools would agree to a certain quota of women students.” The Senate, in approving the Committee's Report, asked the Vice-Chancellor to invite the Medical Schools, to whom it was communicated, to consider the possibility of admitting a quota of women students as a means of giving effect to the policy of the University as set out in the Report.

To what extent it may be possible to allow for Hostel accommodation on the Bloomsbury Site is a matter which has not yet been decided, but meanwhile, for individual cases, a policy of giving preference to teachers and students of the University by adapting houses to their requirements has been both approved and put into execution. I am betraying no secrets when I say that the Committee of the Senate dealing with the Bloomsbury Estate as a whole has, under the Chairmanship of Sir William Beveridge, done a very great deal of work during the year on the general question of accommodation on the Site. On the recommendation of that Committee four purposes, namely, an Administrative Block, the Library, a Great Hall, and provision for the Union Society, to which I have already referred, have been definitely approved by the Senate for inclusion in any general architectural plan.

Exportation of Horses*.

DURING the year 1927 10,066 horses were shipped from Great Britain to the Continent of Europe after having passed the veterinary

* Abstract from the Annual Report of Proceedings under the Diseases of Animals Acts for the year 1927.

examination required by the Diseases of Animals Act of 1910, as amended by the Exportation of Horses Act of 1914. In addition, 1,360 horses which were presented for examination before shipment were rejected. The standard of fitness required by these Acts in respect of every horse passed for shipment, is that it must be fit to be conveyed and disembarked without cruelty and capable of being worked without suffering. The following statement shows the number shipped at each port and their destination :—

Port of Shipment.	Belgium.	Holland.	France.	Other Countries.	Total.
Folkestone.. ..	—	—	2,281	—	2,281
Goole	774	681	—	76	1,531
Harwich	1,258	244	—	130	1,632
Hull	65	287	—	89	441
Leith	3	1,327	13	81	1,424
London	98	2,498	36	17	2,649
Southampton ..	—	—	96	12	108
	2,198	5,037	2,426	405	10,066

In all only eight casualties occurred amongst the animals shipped to the Continent. Of these one was slaughtered and seven died—they were distributed amongst seven different voyages. The continued small number of casualties in this traffic is very satisfactory.

The following table shows the number of carcasses and number of live horses exported to the Continent of Europe from the years 1920 to 1927. No statistics of carcasses exported were kept prior to 1920 :—

Year.	Total Number of Carcasses Exported (approx.).	Number of Live Horses Exported.	Total (Horses and Carcasses).
1920	15,972	58,689	74,661
1921	24,918	45,120	70,038
1922	38,739	17,941	56,680
1923	53,928	17,067	70,995
1924	61,602	25,645	87,247
1925	64,357	13,477	77,834
1926	46,483	7,356	53,839
1927	48,662	10,066	58,728

The figures for 1922 to 1924 in Columns 2 and 4 of the above statement differ from the corresponding figures contained in previous Annual Reports, as they have been adjusted from revised returns received from the countries to which the carcasses were exported.

It will be seen that there was a small increase in the number, both of carcasses and live horses, exported during the year as compared with the year 1926.

On November 7th, 1927, an Order was issued by the Ministry amending in certain respects the Exportation and Transit of Horses, Asses and Mules Order of 1921, which is the Order governing the export of horses to the Continent. The most important requirement of the Amending Order is that which makes it an offence to carry horses, asses or mules from a port in Great Britain on any voyage when in the judgment of the master of the vessel, there are reasonable grounds for anticipating that, owing to adverse weather conditions the voyage would be attended by serious injury or suffering to or loss of life amongst the animals.

Cancer of the Right Testicle in a Mule. (Tumour of the Interstitial Cells).*

By DR. D. BALL and PROFESSOR DOUVILLE.

EXCEPTIONAL in man, tumour of the interstitial cells is equally rare in animals. Described for the first time in human pathology by Chevassu (1906), then by Kauffmann Dürck, P. Masson, this tumour has been observed both in the ectopic and descended testicle.

In comparative pathology the first work on this tumour is due to one of us (M. Ball)† who in 1922 published two cases in the dog, and who, since this period, has been able to study a third case in this animal, observed by M. Revillon, veterinary surgeon in Lyons. These three cases of tumour of the interstitial cells have been in the descended testicle.

We publish to-day the first case of tumour of the interstitial cells in a mule.

The patient, 15 years old, showed a general satisfactory condition. The right testicle was very large. On palpation the surface of the

* *Revue Vétérinaire*, Sept., 1926.

† Ball: "Two Cases of Tumour of the Interstitial Gland of the Testicle in the Dog," *Bull. assoc. fr. pour l'étude du Cancer*, 1922.

gland appeared dented, and its consistence firm. The corresponding testicular cord was normal. The growth in volume of the testicle had been observed for about six months. This growth had been progressive and, a curious detail, we have noticed volumetric variations of the affected testicle, following work, variations which seemed allied to transient phenomena of congestion and œdema. Rectal exploration made with a view of discovering secondary neoplastic adenopathy of the pelvic and subhilar regions remained negative. Diagnosis of cancer of the right testicle being made, castration was practised on May 7th, 1925. After healing, the subject left the infirmary and has not returned. The cancerous testicle had visibly preserved its general shape, although slightly elongated. On the surface of the gland voluminous and sinuous veins could be seen. The organ weighed 5 lb., measured $4\frac{1}{2}$ in. long, 3 in. wide, and $2\frac{1}{4}$ in. thick; its consistence was firm and elastic. On longitudinal and median section there was no trace of testicular parenchyma. The surfaces of section showed lobulated structure. The general colour was greyish-yellow, but certain neoplastic lobules showed light maroon or violet colour where hæmorrhages had taken place. The lobules of rounded form, elongated or polyhedral, measured several centimetres in diameter and were separated by a conjunctive stroma reduced to a greyish colour. Each of these large lobules consisted really of several smaller lobules. Examined under low power the histological sections of the tumour showed a curious liver-like aspect, as noted in man in a case studied by Kauffmann.

The tumoral tissue was composed of species of neoplastic lobules badly defined and separated by a little developed conjunctive stroma. The neoplastic cells which constituted them were heaped up without order or disposed in rows and anastomosed bays, and separated in places by numerous blood vessels. These cells were voluminous, polygonal or sometimes slightly elongated, with dark protoplasm, very acidophile, coloured deep rose by eosin, sometimes vacuolar, with pigmentary ochre granulations. The nucleus of the cells was rounded and more or less excentric.

These cells, therefore, recall the *interstitial cells* of the normal testicle. They were differentiated from *seminoma*, the most frequent tumour of the testicle, by their greater volume and deeper colourability. The neoplastic cells are sometimes arranged as a rosette or circular palisade around blood vessels. In this case they are stretched, cylindrical or in racket form.

In all the cases observed in animals there was no glandular or visceral metastasis.

Ascaridia Encrusted in the Shell of a Hen's Egg.*

By M. HENRY.

I HAVE the honour of presenting to the Academy a very curious egg, of which the shell presents on its surface, and in relief, an ascaridia which is found encrusted at the time of calcareous deposition in the shell cavity.

It is not rare to observe the presence of parasites in the interior of hen eggs. They come from the intestine or cloaca and ascend more or less far into the oviduct, whether by their own movements or by the contraction of the wall of the uterus.

Ascaridia are among the parasites most frequently met with in these conditions. They always strike the popular imagination and are often compared to small serpents. But it is much more rare to find ascaridia encrusted in the calcareous wall; that is why I am presenting this curious egg which will be deposited in the Museum of the Alfort School.

I must remark that the anterior extremity of the worm probably least solid, is wanting for a length of about 15 millimetres, but one finds traces of its insertion. On the other hand a small breach has been made at one place which makes the cuticle of the worm appear and furnishes undoubtable proof of the origin of the ornamentation.

History records five similar and almost identical observations: Aldrovande (1642), de Cleyer (1682), Monti (1757), which three for a long time have been considered as pure phantasies—that in the Turin Museum and that of Pavesi (1893).

**Annual Report of the Surgeon-General,
U.S. Army, 1928.**

MAJOR-GENERAL M. W. IRELAND, the Surgeon-General of the United States Army, makes his report to the Secretary of War. It is a comprehensive production of 391 pages, dealing with the health and diseases of the army, the medical schools, general hospitals and particular activities, corps area, overseas, miscellaneous. The mean annual strength of officers was 11,566, and of the white enlisted men for the total army, 108,989. The coloured troops who served overseas was 3,898, the Filipinos numbered 6,869, and the Porto Ricans 1,579. The mean annual strength of the total army, excluding nurses, was

* *Bulletin de l'Académie Vétérinaire de France.* May 1928.

132,901. Colonel W. G. Turner, V.C., is the chief of the Veterinary Division. The average number of animals in the service of the army was 40,433, the average number of veterinary officers 102, and the number of animals under the care of each officer, 396. The Veterinary Bulletin is published monthly, and is a means whereby officers may report interesting cases and comment be made on matters of general interest. One hundred and one original articles have been written by officers of the Veterinary Corps. As regards organised reserves, there were 1,067 officers in the Veterinary Reserve Corps. Instruction and training are provided for in the Army Veterinary School and Medical Service School, and other special schools and institutes. It is stated that at the present time it is almost impossible to enlist a horseshoer that has had experience, and the army must train its own. The Veterinary Corps is responsible for the competent and thorough inspection of all foods of animal origin intended for army use. An inspection of all forage is also carried out. Quite an appreciable amount of material is returned or condemned in both categories. A number of remounts are purchased annually, and up to December 31st, 1927, 14,886 had been bought, and the total loss from all causes was 1,555.

The greatest need of the Veterinary Service at this time is adequate hospitals of a permanent type of construction, the present ones consisting solely of those made from salvaged material.

The chief communicable diseases were tinea, influenza, strangles, and epizootic lymphangitis. There was no case of surra, and only five cases of glanders which developed in the horses of the National Guard at a small out-station.

Epithelioma of the Perineal Glands in the Dog.*

By M. DUPAS, *Fourth-Year Student at Alfort.*

IN a memoir entitled, "Cancer in the Domestic Animals—Original Researches."

(1) Professor Ball, of the Lyons School, has devoted a chapter to epithelioma as of this kind in which he described three personal observations and gives anatomo-pathologic details; he classes them among cancers of the baso-sebaceous type and recognises two varieties (1) of typical adeno-epithelioma form and (2) an atypical or meta-atypical variety.

* *Recueil de Méd. Vétérinaire*. Aug., 1928.

We have had the opportunity of observing a case whilst assisting Professor Coquot. It was of the metatypical or atypical variety in a mongrel dog of large size 13 years old.

This animal was brought into the Alfort clinic on April 19th last and showed around the anus a series of tumours of varied size, well defined, of which the most important one was situated between the superior anal commissure and the base of the tail, appeared much more developed than its neighbours, and plainly pedunculated; a second rather less in size was immediately contiguous to it on the left. Three others of less size were disposed laterally to the sphincter.

Finally, a last one, isolated and the size of a pea, deformed the inferior profile of the caudal appendage some ten centimetres from its base.

The principal tumour was pear-shaped, about 100 grammes in weight, hanging over the perimeal region; its surface was umbilicated, irregular, shallow, ulcerous; ulcers badly defined, from which escaped bad smelling discharge. No other lesions on the tumours.

The age of the dog, the large size of the neoplasms, the umbilications and ulcerations pointed to cancer; but it was noticed that the animal was lively, in good condition and even fat.

The patient was left in hospital. On April 21st we operated on the two upper tumours and removed them, reserving the ablation of the others until later on, except the caudal metastasis, which was ligatured with silk. The operation wound, wide and deep, healed up in three weeks without leaving any residue except a little nodule ascertainable on careful palpation; as for the caudal metastasis, it disappeared and withered away in a few days.

A month after the first operation the accessory nodules have increased and developed to the size of a pigeon's egg and show discharging ulcerations. We removed them on June 2nd. The fresh surgical wound healed up normally. After 15 days the region is clean, the scars hardly visible and the dog is returned to the owner: prognosis is not hopeful, evidently almost certain to be a relapse and probably a more or less early generalisation.

Anatomo Pathologic Study.

With the naked eye, the neoplastic tissue examined in the fresh state was a brownish yellow colour, of shiny and translucid appearance and firm consistence. The sectioned surface is irregularly lobulated and here and there one notices cavities of necrotic or pseudo-cystic origin.

Histological examination after staining with hematin-eosin showed a structure quite comparable to that described by Professor Ball in his important memoir that we consulted.

We distinguished important glandular or pseudo-glandular lobules of medium size, rounded or quite irregular and atypical, sometimes widely anastomosed and separated by a quite discrete conjunctivo-vascular frame work.

These epitheliomatous areas, viewed at 300 diameters, showed formed epithelial clearly polyhedric, more voluminous than those of normal perineal glands. The limits of these cells are difficult to see, so many being serrated and fused together. We found, irregularly divided, more or less numerous "microcysts" (M.K.), which seemed to spring from sebaceous cells become cavitous and as a result looked like unicellular cysts. Certain of these epithelial cells, in a more or less advanced stage showed a reticular or vacuolar protoplasm (C.R.V.).

Finally, at the periphery and in the epitheliomatous lobules one could distinguish generic cells identical with those of the baso-cellular epitheliomas (C.G.). A conjunctive stroma, little developed, separated voluminous blood vessels; we have called it, lobular formations (C.C. and V.). Colouring with Soudan III, an excellent fat reagent, showed numerous little foci coloured intense brick red, revealing the indisputable sebaceous nature of this cancer.

This was a cancer of the type already described by Professor Ball and mentioned by Jacger. It is rare and has been little studied.

Six Years of Prophylaxis of Bovine Tuberculosis with B.C.G. in an Infected Holding (1922-1928).*

By M. P. BRINET,

Veterinary Surgeon at Magny-in-Vexin (Seine et Oise).

THIS account refers to a large holding situated at a place called "Le Boulleau," belonging to M. de CH—. The herd comprised 80 head, 40 of which were milk producers for Paris. The sheds were of old construction, practically non-disinfectable, but very well kept. The great cultural extent of the farm necessitated careful book-keeping, state supervision and records of the movement of animals.

**Recueil de Médecine, Vétérinaire, March, 1929, Tome C.V.*

From this register it was noted that Nocard made a general test with tuberculin in 1895. One cowhouse gave 89 per cent. of positive reactions, another 100 per cent., the smallest 40 to 60 per cent. Since this period tuberculosis has always been prevalent on the holding. Every year an average of 5 or 6 partial or total seizures have been made on slaughter of the animals at the end of their economic career.

In Jan., 1922, the owner expressed a desire that in view of the likelihood of the young calves being infected with tuberculosis from the surroundings, that they should be dealt with.

In 1922, vaccination by the intravenous method was carried out and on Jan. 1st, 1923, subcutaneous inoculation was commenced. The procedure was carried out as far as possible in the first fifteen days of life ; but in the course of the first years of vaccination this rule has not been always strictly followed ; in a few animals vaccinal inoculation has only been made in the first month after birth.

The mode of procedure has been complete isolation of the calf from birth, with sojourn of all of them together in a common shed, bucket feeding at first with raw milk from the mother, followed by mixed milk of the whole of the herd. Annual re-vaccination has been performed regularly in Feb. of each year. Up to Jan. 1st, 1928, 300 animals have been vaccinated and re-vaccinated in the course of these 6 years, without incident. Two cold abscesses formed at the point of the inoculation of B.C.G., opened themselves spontaneously, evacuated and closed without any trouble.

In the same space of time 10 animals have died or been slaughtered because of the malady. It is to be noted, after, that one only of these bovines, a bad-doer from birth, slaughtered at the age of one year for emaciation, was affected with generalised tuberculosis. Should this unfortunate case be put down to a tardy vaccination (a month after birth), or to massive infection, since birth, by a very infective maternal milk ? It is impossible to prove either of these hypotheses.

On the other hand since the first of Jan., 1926, 35 animals 4 years old at least, arrived at the finish of their career and have been sent to the abattoir, none have been seized or even declared tuberculous ; 13 other cows, pregnant or recently calved, have been sold as " Parisians," that is to say, have passed into the dairies of Paris or its suburbs. One only having reacted to tuberculin has been taken back by the owner. This animal, in a perfect state, has been resold the following year, without the new buyer making any reclaim.

The scientific controversies relative to the B.C.G. which for several months have occupied the tribune of our learned societies are certainly

of the greatest interest ; but we practitioners cannot follow the savants on their terrain. We must content ourselves with the interpretation of facts which we are called to establish and the practical lessons which we derive from them.

The owner of the holding recently stated to me : " Since my animals are vaccinated and re-vaccinated against tuberculosis we have no longer to register seizures for this cause in the abattoirs ; from this fact the ' Profit and Loss ' account of the balance sheet of my holding is favourably impressed."

It must not be forgotten that the prophylaxis of contagious diseases of cattle is above all a step in rural economy. All progress in this direction ought to be marked with a white stone and this will be the conclusion of this six years' experience, gathered and reported in all simplicity.

Abstracts of Current Literature

Geibel.—A Case of Thuja Poisoning.—*Zeitschrift f Veterinärkunde*, Vol. 40, No. 6.

AN eighteen year old draught horse during a short pause at work ate some twigs of *Thuja occidentalis*. One to two hours after stabling he staggered and ate nothing. Next morning he stood apathetically in the stall ; temperature $102\frac{2}{5}$; breathing quiet, pulse weak, 90 per minute ; conjunctivæ blanched. Sensibility in the region of the left quarter was diminished and in the right extinct ; the area round the arms was anæstheticised. The dung, badly balled, was coated with glistening slime and was passed in usual quantity. In leading out the horse progressed diagonally and staggered considerably. He sank down in the hind quarters. Food was not taken and only a little water.

TREATMENT. Mucilaginous diet, laxatives, cardiac stimulants. Little improvement in appetite for four days. Temperature $102\frac{4}{5}$; pulse 75. In the course of a week he lost the anæsthesia and the staggering gait. After fourteen days he had recovered.

Winterberger, J.—A Case of Antimony Poisoning in a Cow.—
Wien. Tierarzt Monatsschrift. Vol. 15, No. 10 ; pp. 464-465.

A cow seven months in calf was given repeated doses of antimony tartrate for stoppage by a quack and as it was suffering from antimony poisoning it had to be slaughtered.

CLINICAL SYMPTOMS. Respirations 50, pounding heart beats, irregular and intermittent, temperature 103, rumination suppressed, lively movements of calf, trembling, colic, collapse, exhaustion.

Post-mortem. Intestinal mucosa pale yellow, fatty degeneration of the liver, in the kidneys large clear spots, hæmorrhages into the peritoneum and mesentery, œdema of the lungs, heart muscle soft and yellow tinged, hæmorrhages under the epi and endocardium.

News

Sheep Dipping Film Demonstration at the Royal Veterinary College.

ON the 22nd of March an interesting demonstration before a very appreciative audience of students, and others, was given in the large Lecture Theatre of the Royal Veterinary College, Camden Town, through the courtesy of The Cooper Technical Bureau, in the form of a cinematographic film exhibiting many of the aspects of parasitic infections in sheep and cattle.

The incidents depicted in the film had been photographed in many parts of the world—Great Britain, the Argentine, South Africa and Australia. The subjects included such external parasites as ox warble, psoroptic scabies of sheep, liver fluke in sheep and stomach worm infection in sheep. Various methods of dipping sheep and cattle as practised in the various countries were well illustrated. Particular interest attached to a circular type of dipping bath with a central island which is extensively used in South Africa. This type of bath possesses the advantages of a long swim bath in small compass and facilitates control of the animals in the course of dipping.



The concluding portion of the film showed some interesting topical pictures of mustering and shearing of large merino flocks in Australia. At the conclusion of the film exhibit Dr. L. E. Robinson, the Chief Biologist of the Cooper Technical Bureau gave a short account of recent developments in knowledge relating to liver fluke infection and its treatment in sheep and sheep scab. He laid particular emphasis on the incidence of a definite latent period in the activity of sheep scab in the summer months, and expressed the opinion that recognition of this latency was a matter of some importance in connexion with preventive and curative measures.

In the discussion that followed, Professor Douglas Stewart, Dean of the Faculty of Veterinary Science, University of Sydney, and Mr. Walter Prudames, M.R.C.V.S., gave short addresses.

Review

Geburtshilfe bei den Kleinere Haustieren. 2nd edition. By Dr. KARL KELLER, Professor at the Veterinary School in Vienna. Berlin N24 and Vienna: Urban & Schwarzenberg. Pp. 233, 63 figs. in the text, and a coloured plate. Price 12 marks; bound, 14.40 marks.

THIS is one of the sections in manual form of Dr. Eugen Fröhner's and Dr. Theodore Schmidt's "Veterinary Surgery and Obstetrics." The obstetrics of the smaller animals is a domain in itself, and the author has received the assistance of two such experts as Dr. Franz Benesch and Dr. Paul Schindler in the preparation of his work. He also acknowledges the help that De Bruins labours earlier on in the same field, has afforded him. Parturition in small ruminants, swine and carnivora is dealt with. Obstetric anatomy, physiology, normal and abnormal pregnancy and parturition, birth hindrances, parturition interferences and operations, sequelæ, and the pathology of the puerperium are all fully discussed. The coloured plate illustrates a perforating ulcer of the uterus in the bitch. As is usual with the veterinary surgeons of Central Europe, these authors state their preference for the flank operation in Cæsarean section over that by the linea alba. From 1906 to 1926 on 337 cases operated on by *sectio cæsarea conservativa* they had 292 recoveries or 87 per cent. In hysterectomy, *according to Porro*, in the same period out of 238 cases they had 145 recoveries or 61 per cent. The manual is a welcome addition to the literature of obstetrics in the smaller animals.

Correspondence

Abortion in Bitches.

The Editor, THE VETERINARY JOURNAL, London.

DEAR SIR,—

Would you allow me a little space to ask if any members of the profession would let me have details of any cases of the above that they have encountered during recent years. I should especially like to hear of anything in the nature of an epidemic or what may have appeared to have been contagious abortion in kennels. Also I shall be glad to receive data concerning excessive puppy mortality in breeding establishments, and indurating mammitis in freshly whelped bitches. I am especially interested in those cases that have occurred amongst foxhounds, and if bacteriological examinations have been carried out I should be glad to hear the results.

Yours faithfully,

J. V. S. RUTTER, M.R.C.V.S.,
Gwynne House, Hereford.

Personal

More than an ordinary word of thanks is due to Mr. Herbert Buckingham, of Norwich, for the splendid effort which he has made amongst his clients and friends on behalf of the Rebuilding Fund of his Alma Mater, the Royal Veterinary College. Recently, as a fitting celebration to the 66th anniversary of his birthday, Mr. Buckingham added £250 to the College Funds—and this means the actual amount of £500 when the Government pound for pound becomes added. The wish of the old College is that it could find a few more workers possessed of the same enthusiasm and determination to help forward the good cause which aims at providing the much needed facilities to put the pioneer College of the English speaking nations in such a position that it can hold its head up amongst the Colleges and Veterinary Schools of the world.

Mr. H. G. STEWART, M.R.C.V.S., appointed Veterinary Officer for Uganda.

Mr. J. HEARD, M.R.C.V.S., appointed Veterinary Officer for Nigeria

Publishers' Notices

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THE VETERINARY JOURNAL

JULY, 1929.

Editorial

THE EARLY HISTORY OF VETERINARY LITERATURE.

AGAIN we are proud to be able to put before the profession another precious landmark of veterinary history, a labour of love and an additional testimony to the wonderful and indefatigable energy of the greatest historian our profession has ever known, Major-General Sir Frederick Smith. No individual man has done more for the profession than Sir Frederick Smith, and no man has had greater difficulties to overcome. Fred Smith's Physiology has been for years the textbook of the student in every College where the English tongue is spoken, but how few of those who studied its pages have ever imagined the almost insuperable difficulties under which it was originally written. The conditions of the Army Veterinary School when Major Fred Smith took over its command, cannot be spoken of in the same breath as the comparatively luxurious advantages which are enjoyed by those at the present well-equipped establishment. Anyone but the man whose energy and love for his profession still continues as great as ever it did would have despaired of ever attaining anything other than a mere reputation for being a good officer; and the self-denials practised by Smith and Butler, and the other pioneers of the scientific base upon which the Royal Army Veterinary Corps is now built, are only known to their few privileged friends.

Now, at an age and time when most other men would be resting on their well-earned laurels, after taking, too, an active part in the greatest of all wars of modern time when already on the retired list, our greatest of all veterinary historians presents to his beloved profession a work which will stand for all time as a monument to his name and to English Veterinary Science.

As a final line we thank him for what he has done and congratulate the readers of the VETERINARY JOURNAL on the opportunity which is presented to them of obtaining this latest landmark of veterinary history as an additional asset to their literary library.

General Articles

AN EXAMINATION OF A NUMBER OF CASES OF OVINE MASTITIS.*

By W. J. LEYSHON, M.R.C.V.S.,

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THE purpose of this article is to record the results obtained in the investigation of a number of cases of mastitis in ewes. The work which has been in progress during the past four seasons, was undertaken in response to representations that the disease was very prevalent in the Eastern Counties, and caused a large number of deaths annually. It was, therefore, reasonable to anticipate that abundant material for examination could readily be obtained. Unfortunately for our purpose, however, these expectations have not been realised. The incidence of the disease during this period has undoubtedly been low, and it has been possible to obtain material from thirty-eight cases only, all of which have occurred more or less sporadically. Nothing in the nature of an extensive outbreak of the disease in a flock has been encountered up to the present. The work is, therefore, only in its preliminary stages, but as it is now interrupted in so far as the present writer is concerned, it is proposed to record the results which have already been obtained.

History.

Gangrenous mastitis has been termed by French shepherds "Mal de pis" or Araignée.

One of the earliest writers on the subject was Hurtrel d'Arboval¹ (1823), who mentioned that the condition was erroneously believed to be due to the bite of an insect. He described an acute inflammation of the udder, but was unable to explain why the disease was more frequently fatal in sheep than in other species of animals. Kotelman² (1836) observed the condition in Prussia in an enzootic form, and gave a full clinical description. Lafosse³ (1856) described an outbreak occurring near Toulouse and Rivolta⁴ (1875) gave an account of a septic form of mastitis occurring sporadically around Pisa. The milk contained a large variety of microcci and fine bacilli.

Nocard⁵ (1886) studied an outbreak at a farm at Joinville and later at Larzac. The condition was, at that time, prevalent in France in an enzootic form. The symptoms and lesions which he described closely resemble those of "black garget" as seen in this country. From the

* This work was carried out in the laboratories of the Department of Animal Pathology, Cambridge.

udder secretion of affected ewes, he obtained a pure culture of an extremely small coccus rather less in size than one of the deeply staining poles of the fowl cholera bacillus. A typical and fatal case of the disease was produced in a lactating ewe by the injection of a culture of the organism by way of the teat canal. Injection of the culture into the gland substance of a goat produced a local reaction. Subcutaneous inoculation was fatal to the lamb, and resulted in local abscess formation, in one case followed by death, in the rabbit. The horse, calf, pig, cat, dog, fowl and guinea pig proved to be refractory when tested by this route. Nocard failed to reproduce the disease by painting the ewe's teat with culture, though he believed the teat canal to be the common channel of infection in natural cases. He considered that the coccus produced a toxin in the animal body which caused a local necrosis, and general toxæmia. It probably survives in the soil and manure of sheep folds, and infection may be spread by shepherds and castrators.

Mathis⁶ (1895) isolated from a case of gangrenous mastitis in a goat an organism similar to that described by Nocard. Esser⁷ (1889) described the condition in the neighbourhood of Göttingen. Bridré⁸ (1907) expressed the opinion that the micrococcus of Nocard is a normal inhabitant of the ewe's mammary gland, and that it produces mastitis only in the presence of some internal lesion of the organ which allows of its rapid multiplication and invasion of the tissues.

This author was successful in immunising ewes by vaccinating them with an attenuated culture of the organism. The mortality among vaccinated animals was 0.4% as compared with 3.35% among the controls.

Pfeiler⁹ (1908) confirmed Nocard's findings regarding the etiology of the condition. Gilruth¹⁰ (1910) investigated five cases of mastitis in ewes in New Zealand from which he isolated a coccus indistinguishable in its morphological and cultural characters from that of Nocard, and, in addition, he obtained a small Gram positive anærobic bacillus. The experimental injection of the coccus in pure culture into sheep and rabbits produced results similar to those described by Nocard. The anærobe gave negative results on inoculation, whilst the injection into the ewe's udder by way of the teat canal of the original secretion or of a mixture of the two organisms produced but slight reaction.

Eliore¹¹ (1922) gave an account of a form of mastitis in ewes caused by the bacillus of Preisz-Nocard which was almost always fatal.

A disease known as Contagious Agalaxia has been recognised for many years among sheep and goats in South West Europe, and Northern Africa. It is characterised by inflammatory lesions of the udder, the eyes and the joints. The cause is a very small organism of

about the same size as that of bovine pleuro-pneumonia which it resembles in that it passes through certain bacterial filters and can be grown in artificial media.

Symptoms.

In the Eastern Counties of England flockowners recognise two clinical forms of mastitis of which "black garget" is the more virulent. The illness is sudden in its onset, runs an acute course, and frequently proves fatal in a short space of time. It is so-named because the affected udder quickly assumes a somewhat dark livid colour. The other type, which is termed "stone garget," includes cases of a more chronic character, which appear to result from a localised infection of the udder. Such cases usually end in recovery of the animal leaving a permanently indurated area of the gland tissue varying in size from that of a broad bean to that of a lemon.

In the early stage of the disease, the ewe is found to remain apart from the rest of the flock. The animal has a dull appearance, the ears droop and there may be a slight lameness in progression, due, no doubt, to an endeavour to relieve the pressure of the hind limbs on the inflamed gland. In acute cases the appetite soon disappears, the visible mucous membranes are injected, the pulse is full and strong and two or more degrees of fever may be registered. In almost all cases the disease is confined to one half of the udder.

On palpation the affected gland is hot, tense, and painful. The early changes in the udder are accompanied by the appearance of subcutaneous œdema which causes a diffuse swelling of the tissues anterior to the gland, and spreads forward along the under surface of the abdomen. The characters of the secretion from the affected half vary according to the stage of infection. For the first few hours the milk is not visibly altered although it contains numerous organisms. After twenty-four hours the secretion changes to a yellowish serous fluid containing small clots or flocculi and cells of various kinds. Later it becomes thickened or more creamy in consistence, due to the presence of large numbers of cells chiefly leucocytes and catarrhal cells.

In very acute cases, death may ensue in from twenty-four to forty-eight hours after the appearance of symptoms. It is nearly always preceded by the onset of diarrhœa. In many cases after about the third day the udder becomes gangrenous. It assumes a dark livid colour which is especially well marked around the teat base. On palpation it is found to be cold and of a doughy consistence, sometimes emphysematous. The secretion is of a dirty reddish colour, and has a putrid odour. In most instances in which gangrene supervenes, the general condition of the animal becomes rapidly worse, and death

occurs in two or three days. Occasionally, however, the animal survives, in which case the gangrenous portion of the udder sloughs away, and healing slowly takes place.

In the absence of gangrene, an abscess may form in the affected gland, and rupture externally. In such cases, the animal usually recovers, but the affected half of the udder remains in an atrophied and sclerotic condition.

In uncomplicated cases of mastitis, the ewe may show signs of improvement on or after the fifth day of illness. The temperature gradually falls, the appetite returns, and the animal recovers her general health but the udder is never restored to its normal condition after a severe attack. The affected part, when resolution has occurred, shows marked atrophy and sclerosis as a result of the destruction of the glandular elements, and the formation of fibrous tissue. The part thus becomes functionless.

In mild cases, in which the infection is confined to a limited area of the gland tissue, a circumscribed area of induration, the so-called stone garget, is the result.

Occurrence, Incidence and Mortality.

Mastitis in the ewe is a condition which occurs almost exclusively in the lactating animal. Cases may be seen shortly after lambing commences, and may continue to occur from then onwards until a few weeks after the lambs are weaned.

The incidence of the condition varies considerably in different flocks, and from one season to another. The highest figure encountered in a flock in one season during the course of this investigation was no more than 6%, but one farmer has recently reported that during last lambing season he had 68 cases of which 43 were fatal, in a flock of 394 animals. This is equivalent to an incidence of 17.25%, and a mortality of 10.9% (percentage of death, in affected animals 63.23).

Among the thirty-eight cases actually included in this report there were eighteen deaths—a percentage of 47.36.

Morbid Anatomy. On *post-mortem* examination of an animal which has died within the first few days of the onset of symptoms, the affected half of the udder appears more bulky than normal, and the overlying skin may be discoloured. The subcutaneous tissues around the gland, and along the under surface of the abdomen, are in a gelatinous condition, as a result of serious infiltration. On section of the affected udder there is exudation of a serosanguineous fluid mixed with milk. The consistence is more solid than that of normal gland. The cut surface presents an appearance of exaggerated lobulation due to thickening of the interstitial tissue. The changes which are diffuse in character

are most marked in the early stages in the area adjoining the teat base, indicating that the process is an ascending one. The affected part has a mottled appearance varying in colour from brownish red to dirty yellow, and may show dark areas of blood extravasation or purulent foci of varying size. Strands of fibrinous or purulent material are frequently present in the sinus. When gangrene takes place the tissue becomes emphysematous and is saturated with a thin blood stained fluid having a very offensive smell.

Animals dying of mastitis may show abnormalities of some of the internal organs. The lungs are often congested. The spleen may be slightly enlarged and somewhat softer than normal. The liver and kidneys are hyperæmic and in some cases show cloudy swelling or slight fatty changes. The serous cavities contain a small quantity of blood-stained fluid and may show petechial markings. Definite metastatic lesions were not present in any of the cases examined.

Histology.

The changes produced in the udder of the ewe as a result of mastitis are of the acute inflammatory type. The exact appearance presented in any particular case depends on the type of infection and the intensity and duration of the inflammatory process, but there are certain features which appear to be common to all cases at least in the early stages. Of these perhaps the most striking is intense congestion of the blood vessels accompanied by the outpouring of inflammatory exudate rich in fibrin. The presence of this exudate causes a marked thickening of the interstitial tissue between the lobules as a result of which the septa appear as thick bands composed largely of strands of fibrin. Leucocytic migration is always present and in some cases is very marked. Another constant feature is a catarrhal condition of the epithelial lining of the acini and milk ducts. The infecting organisms are scattered abundantly throughout the inflamed tissue, in many parts of which they are seen grouped together in clumps. It is in the neighbourhood of these clumps that the tissue changes appear to be most marked. In cases which have succumbed to the very acute form of staphylococcal infection there is considerable destruction of the glandular tissue. Necrosis affecting whole groups of acini may be seen. Many of the epithelial cells are shed and lie scattered within the lumen which also contains finely granular material and clumps of cocci. Where necrosis has not occurred there is simple desquamation. Here and there some of the cells that remain attached to the walls commence to proliferate, and where this occurs the acini becomes more or less completely filled with masses of cast-off cells together with a few leucocytes. Marked blood extravasation may be present in some

areas. The milk ducts are filled with a cellular exudate mixed with fibrin. In cases of three or four days duration the migration of leucocytes is more marked and there is evidence of the formation of small abscesses and commencing proliferation of connective tissue. In streptococcic mastitis the changes are very similar to those already described. There is intense congestion of the blood vessels, with local extravasation of red cells and marked thickening of the septa due to the presence of fibrin. Areas of the gland tissue may be completely necrosed but these are not so extensive as in staphylococcic infection. On the other hand proliferation and desquamation of the epithelial cells is in general more marked. These changes are accompanied by the migration of polyneuclear leucocytes in considerable numbers, and by the early formation of definite small abscesses in the inflamed tissue.

In cases due to bipolar infection the blood vessels are very congested and the septa distended with fibrinous exudate. The acini show acute catarrhal changes accompanied by proliferation of the epithelium and tend to become filled with cellular exudate together with a variable proportion of fibrinous or granular material. Migration of leucocytes is not so well marked as in the other types of infection, and there is little or no necrosis of the gland tissue.

No material was available for examination from natural cases dying as a result of a pure infection by an organism of the coliform type. In two experimental cases the changes in the udder were mainly of a catarrhal nature. Exudation into the interstitial tissue was not so marked as in other types of infection. The chief features were proliferation and desquamation of the lining cells of the acini together with considerable leucocytic migration. In one of the cases which survived until the tenth day the leucocytes were present in very large numbers and there was evidence of fibroblastic multiplication.

Methods of Examination.

Every effort has been made to obtain material for examination as early as possible in the course of the disease.

In some cases we have been able to do this within a few hours of its commencement, and in many within forty-eight hours. A few cases however, are included in which the attack had lasted some days or even weeks, but any in which the interior of the udder was exposed during life have been discarded. Ordinarily the practice has been to collect and examine samples of udder secretion and sometimes blood. Where opportunity has occurred a further examination has been made *post-mortem*. The method adopted in taking samples of udder secretion was the following. The udder was first washed with 5% lysol solution, particular attention being paid to the tip of the teat which was after-

wards swabbed with tincture of iodine. The first few gushes of secretion were discarded, and a sample was then taken in the usual manner into wide-necked sterile bottles. Smears were prepared (a) direct from the secretion (b) from the deposit after centrifuging. These were stained by the ordinary methods and examined for the presence of organisms. Cultures were made on various media including slopes of agar and serum agar, glucose broth, meat broth and liver broth. The two latter media were boiled for some minutes and then cooled down rapidly before inoculation. A loopful of the secretion was ordinarily found to be a sufficient quantity of inoculum to give rise to a rich growth. In the case of solid media, subinoculations were made in series so as to obtain suitable dilutions. Inoculations were carried out in duplicate so as to allow of incubation under both aerobic and anaerobic conditions. Wherever possible a further set of tubes was inoculated with a similar quantity of secretion from the healthy side of the udder, but with the exception of two cases in which a few isolated colonies developed, no growth was obtained.

In cases of *post-mortem* examination cultures have been made from the udder tissue, the heart's blood and various organs of the body, especially the liver and kidney.

Bacteriology.

In the majority of instances in which a sample of secretion has been obtained in the early stages of the disease, a pure culture of an organism has been isolated, whereas in those taken after a longer period of illness two or more organisms have not infrequently proved to be present. Two samples (Nos. 27 and 36), both of which were from cases of some standing, yielded no growth. This may have been due to the infection having been overcome at an earlier stage. The organisms obtained from the remaining thirty-six cases comprise staphylococci (24 times) streptococci (8 times), coliform bacteria (7 times), bipolar organisms (4 times), diphtheroids (3 times) and cocco-bacilli (once). The bacteriological findings in each case are set out in Table I.

In Table II they are grouped according to the respective flocks in which the cases occurred.

Characters of the Principal Organisms Staphylococci.

Staphylococci were the commonest type of organism encountered in this investigation. They were isolated from twenty-four of the thirty-six cases from which growth was obtained. In fifteen of these they were present in large numbers in a state of purity, and in the remaining nine they were mixed with other organisms. All strains resembled *Staphylococcus pyogenes* in their general properties, especially as regards their morphology, cultural characters and staining

Table I.

Case Number.	ORGANISMS ISOLATED.							Remarks.
	Staphylococci.	Streptococci.	Coliform.	Bipolar.	Diphtheroid.	Cocco-bacilli.	No Growth.	
1	+(c)	+(b)	+(a)					Survived.
2			+					Survived.
3	+							Died.
4			+					Survived.
5	+							Died.
6		+						Died.
7	+(b)					+(a)		Survived.
8	+(a)	+(b)						Died.
9	+(a)	+(b)						Died.
10	+							Survived.
11	+							Died.
12	+							Died.
13		+						Died.
14	+							Died.
15	+							Died.
16	+							Destroyed.
17			+					Survived.
18	+(a)	+(b)	+(c)					Survived.
19	+							Died.
20	+							Destroyed.
21			+					Destroyed.
22			+					Survived.
23	+							Destroyed.
24	+							Died.
25	+(b)	+(a)						Died.
26	+(a)	+(b)						Died.
27							+	Destroyed.
28				+				Died.
29				+				Died.
30				+				Survived.
31	+							Died.
32	+(b)				+(a)			Survived.
33	+							Survived.
34	+(b)				+(a)			Survived.
35					+			Survived.
36							+	Survived.
37	+							Destroyed.
38				+				Died.

Note.—In the case of mixed cultures the letters (a), (b) and (c) are used as an indication of the relative number of colonies of each type of organism that appeared on solid media, thus (a) means the largest number of colonies, (b) a smaller number than (a), and (c) a smaller number than (b). *

reactions. They were tested as to their chromogenic power by growth on potato. Twenty-three appeared to be of the albus variety although after standing for several days the colour tended to change to a dirty white and in some cases to a dirty yellow, but not to the golden or lemon colour typical of the other varieties of *S. pyogenes*. The remaining strain was *S. pyogenes citreus*. Gelatin was liquefied in every case. Nearly all strains acidified litmus milk and fifty per cent. of them produced a clot which later became digested.

Table II.

Flock.	Season.	Number of Cases.	Staphylococci.	Streptococci.	Coliform.	Bipolar.	Diphtheroid.	Mixed Culture.	Negative.	Description of Mixed Cultures.
A	1925	1						1		Staph. Strept. Coliform.
	1926	4	3		1					
	1927	1						1		Staph. Strept.
B	1925	1			1					
	1926	3	2					1		Staph. Strept.
	1927	2	1					1		Do.
	1928	1	1							
C	1925	1			1					
D	1926	6	2	2				2a & b		(a) Staph. Cocco-bacillus. (b) Staph. Strept. Coliform
E	1926	2	1					1		Staph. Strept.
F	1926	1	1							
G	1926	3	1		2					
	1927	1							1	
H	1927	3				3				
	1928	1				1				
I	1928	1	1							
J	1928	5	1				1	2	1	Staph. and Diphtheroid (in both cases).

Carbohydrate Fermentations.

Tests were carried out in peptone water medium using litmus as an indicator. The various strains when freshly isolated did not appear to be identical in their action on carbohydrates (see Table III). Only

Table III.

FERMENTATION REACTIONS OF *STAPHYLOCOCCI*
AT THE TIME OF ISOLATION.

Number of Case.	Source.	Arabinose	Dextrin.	Dulcite.	Glucose.	Glycerin.	Inulin.	Lactose.	Laevulose.	Maltose.	Mannite.	Saccharose.	Salicin.	Litmus Milk.
1	Udder Secre- tion.	A	A	—	A	—	—	A	A	A	A	A	—	—
3	"	—	A	—	A	A	—	A	A	A	A	A	—	—
5	"	—	—	—	A	—	—	A	A	A	A	A	—	AC
7	"	A	A	—	A	A	—	A	A	A	A	A	—	—
8	"	A	A	—	A	As	—	A	A	A	A	A	—	A
9	"	—	A	—	A	As	—	A	A	A	A	A	—	A
10	"	—	A	—	A	—	—	A	A	A	A	A	—	AC
11	"	—	A	—	A	As	—	A	A	A	A	A	—	AC
12	Udder and Blood. Udder Secre- tion.	—	As	—	AG	—	—	AG	AG	AG	AG	AG	—	AGC
13	Udder Secre- tion.	As	A	—	A	As	—	A	A	A	A	A	—	A
14	"	As	A	—	A	—	—	A	A	A	A	A	—	A
14	Blood.	As	A	—	A	—	—	A	A	A	A	A	A	A
15	Udder Secre- tion.	—	A	—	A	—	—	A	A	A	A	A	—	AC
16	Udder and kidney	As	A	—	A	As	—	A	A	A	A	A	—	AC
18	Udder Secre- tion.	As	A	—	A	A	—	A	—	A	A	A	—	A
18	Blood.	As	A	—	A	As	—	A	A	A	A	A	—	A
19	Udder Secre- tion.	As	A	—	A	A	—	A	A	A	A	A	—	AC
20	"	—	—	—	A	—	—	A	A	A	A	A	—	AC
23	"	As	A	—	A	A	—	A	A	A	—	A	—	A
24	"	—	—	—	A	As	—	A	A	A	A	A	—	AC
25	"	—	—	—	A	As	—	A	A	A	A	A	—	AC
37	Udder and Blood.	—	—	—	A	A	—	A	A	A	A	A	—	AC

A=Acid. As=Slight Acid Production. G=Gas. C=Clot.

very slight differences were, however, observed when a number of them were retested at a later date after they had been kept in artificial culture for several generations (Table IV). They produced acid in

Table IV.
FERMENTATION REACTIONS OF STAPHYLOCOCCI
AFTER SEVERAL SUBCULTIVATIONS.

Number of Case.	Source.	Arabinose.	Dextrin.	Dulcite.	Glucose.	Glycerin.	Inulin.	Lactose.	Laevulose.	Maltose.	Mannite.	Saccharose.	Salicin.	Litmus Milk.
1	Udder Secretion	—	—	—	A	—	—	A	A	A	A	A	—	A
3	"	—	—	—	A	—	—	A	A	A	A	A	—	AC
5	"	—	—	—	A	A	—	A	A	A	A	A	—	A
11	"	—	—	—	A	A	—	A	A	A	A	A	—	A
19	"	—	—	—	A	A	—	A	A	A	A	A	—	AC
8	"	—	—	—	A	As	—	A	A	A	A	A	—	A
9	"	—	—	—	A	As	—	A	A	A	A	A	—	AC
10	"	—	—	—	A	As	—	A	A	A	A	A	—	AC

glucose, laevulose, lactose, maltose, mannite, saccharose and in some cases in glycerin, but had no effect on dulcite, inulin, salicin, arabinose and dextrin. Reference may here be made to the work of Jones¹² on bovine mastitis in the course of which he isolated staphylococci of various chromogenic characters from some of his cases. Eleven of his strains produced acid in glucose, maltose, mannite, saccharose, salicin and inulin, whilst eight others differed in that they gave negative results with salicin and inulin. Litmus milk was coagulated except in two cases.

Pathogenicity.

Two of the strains (from cases 19 and 20) inoculated subcutaneously into guinea pigs produced local abscesses at the site of injection. After these had ruptured, healing took place rapidly, and the animals showed no further ill effects. Strain (Case 19) on subcutaneous inoculation into a rabbit produced a marked local reaction with abscess formation and proved fatal in three days. Strain (Case 20) caused severe inflammation of the subcutaneous tissues and abscess formation but in this case the rabbit survived and the lesion was completely healed after sixteen days.

On 31.10.28 a lactating ewe received an injection into one half of the udder by way of the teat canal of 1.5 c.c. of a 24 hours broth culture of staphylococcus isolated from Case 37. Five hours later the

injected side was swollen, hot and painful. The following day the subcutaneous tissue in the neighbourhood of the gland became swollen and œdematous and this condition gradually spread along the abdomen to the fore legs. The skin of the udder assumed a livid colour and showed blister-like elevations. Later it became cold to the touch, the animal appeared very distressed and her condition rapidly became worse. She was killed on 3.11.28, when *in extremis*. On *post-mortem* examination the injected half of the udder presented an appearance similar to that seen in naturally occurring cases of the disease. The other half appeared normal. The organism was recovered in pure culture from the affected part of the udder. Cultures made from the heart's blood gave rise to no growth. The histological appearance of the udder tissue was indistinguishable from that seen in acute natural cases of staphylococcic mastitis.

Streptococci.

Organisms of this type were isolated from eight cases but were present in a state of purity in only two of these. The various strains with two exceptions differed among themselves in their action on carbohydrates. The strains from Cases 6, 8 and 18 were the only ones that proved to be hæmolytic. Details of the sugar reactions are given in Table V.

Table V.

FERMENTATION REACTIONS OF STREPTOCOCCI.

Number of Case.	Source.	Arabinose.	Dextrin.	Dulcitol.	Glucose.	Glycerin.	Inulin.	Lactose.	Laevulose.	Maltose.	Mannite.	Saccharose.	Salicin.	Litmus Milk.
1	Udder Secretion	A	—	—	A	—	—	A	A	A	—	A	A	A
6	"	A	—	—	A	—	—	—	A	A	—	A	—	—
8	"	—	A	—	A	—	—	A	A	A	—	A	A	—
9	"	A	A	—	A	—	—	A	A	A	—	A	—	A
13	"	A	—	—	A	—	—	A	A	A	A	A	A	—
18	"	A	A	—	A	—	A	A	—	A	A	A	A	A
25	"	A	A	A	A	A	A	A	A	A	A	A	A	AC
26	"	A	A	A	A	A	A	A	A	A	A	A	A	AC

Pathogenicity.

Three strains (Cases 6, 8 and 9) proved to be non-pathogenic to mice on subcutaneous inoculation. In guinea pigs they produced local abscesses which quickly healed after rupture had taken place. The organism from Case 13 was injected into the teat of a lactating guinea

pig but produced no ill effects. That obtained from Case 1 was injected via the teat canal into the udder of a lactating ewe. The dose given was 1 c.c. of a broth culture. Twelve hours later the injected part was swollen but did not appear to be markedly painful until the third day. In the meantime the animal's temperature had risen to 105° F. On the fourth day the inflammation began to subside, and three days later the only abnormality that could be detected was the presence in the udder of a circumscribed lump of the size of a walnut.

Coliform Organisms.

Seven of the cases yielded a growth of gram-negative bacilli. In five of these the organisms were present in a state of purity. The morphological and cultural characters in all cases resembled those of the colon-typhoid group of bacteria. The various strains, however, showed marked differences among themselves in their action on carbohydrates and none of them could be identified with any of the commonly recognised members of that group of organisms. Four of the strains were definitely motile. The reactions are shown in Table VI.

Table VI.
COLIFORM ORGANISMS.

Number of Case.	Source.	Arabinose.	Dextrin.	Dulcite.	Glucose.	Glycerin.	Inulin.	Lactose.	Laevulose.	Maltose.	Mannite.	Saccharose.	Salicin.	Litmus Milk.	Motility.
1	Udder Secre- tion.	A	—	—	A	A	As	A	A	A	A	A	—	—	+
2	„	—	—	—	A	—	—	—	A	A	As	A	As	—	?
4	„	—	—	—	A	—	—	A	As	—	A	A	—	—	+
17	„	As	—	—	As	—	—	—	As	As	As	A	—	As	—
18	„	AG	—	AG	AG	A	—	AG	AG	AG	AG	—	—	AG	+
21	„	A	A	—	—	—	A	—	A	—	—	A	—	—	?
22	„	A	—	—	—	—	A	—	A	A	—	A	—	—	+

Pathogenicity.

Only a very few tests were carried out. The strain from Case 4 proved to be non-pathogenic to mice on subcutaneous and intraperitoneal inoculation. That from Case 22 produced an abscess in a guinea pig at the site of injection under the skin. An experimental lactating ewe No. 66 received an injection into the udder by way of the teat canal of 1 c.c. of a broth culture of the strain from Case 1. The animal showed acute inflammation of the injected half of the gland 18 hours later. By the forty-eighth hour the secretion had changed to a sero-

sanguineous fluid. On the fifth day there was evidence of acute diarrhœa, the appetite was completely lost and the temperature was 105° F. The udder was cold and doughy to the touch. Death took place on the tenth day. On *post-mortem* examination the affected half of the udder showed on section a greyish brown colour. A sero-sanguineous fluid exuded from the cut surface. Abscesses were present in several of the mesenteric glands and there was an accumulation of purulent material in the uterine horns. The cortex of the left kidney showed a small necrotic focus and the lungs were congested and showed areas of pneumonia. The injected organism was recovered from the udder and kidney. The histological appearance of the udder of this animal has already been described.

A similar experiment was carried out with the strain isolated from Case 2. A lactating ewe No. 67 was given an injection via the teat canal of 1 c.c. of a broth culture of the organism. Forty-eight hours later the injected half of the udder was hot, swollen and painful. The temperature rose to 107° F. The animal died on the fifth day. The *post-mortem* appearance of the udder tissue was similar to that of the preceding case. The liver and kidneys showed slight fatty change but the other organs appeared normal. The organism was recovered in culture from the udder but not from the other organs.

Bipolar Organisms.

Organisms of this type were isolated in pure culture from four cases of mastitis, all of which occurred in one flock. The four strains were exactly alike in their general characters which were those of the *Pasteurella* group.

Description.

Small gram-negative bacilli showing distinct bipolar staining. On the surface of agar the colonies were small, discrete and white and showed little tendency to spread. In broth a fine uniform turbidity was produced, and partial sedimentation occurred on standing. No gas was produced from carbohydrates, but acid was slowly formed from some of them. Little or no change could be observed until the third day. After seven days' incubation, acid formation was distinct in dextrin, glucose, laevulose, maltose, mannite and saccharose, and slight in lactose and glycerin. There was no change in arabinose, dulcitol, inulin, salicin and litmus milk. The organism at the time of isolation failed to kill rabbits on subcutaneous inoculation in doses up to 4 c.c. of broth culture. In one case the inoculum used consisted of 3 c.c. of udder secretion from Case 30 but no ill effects were produced.

The Normal Flora of the Ewe's Udder.

In connection with this work a number of tests have been carried

out to obtain an indication of the extent to which organisms are harboured in the udder of apparently normal ewes.

It has frequently been observed in the case of the cow that the normal udder and especially the milk cistern and teat canal contains organisms of various kinds which apparently are able to maintain themselves in limited numbers in those positions but without causing any harmful effects. For instance, D'Heil¹³ reported the finding of such organisms in cows that were regularly milked. Miss Evans¹⁴ records the presence in the cow's udder of a variety of organisms such as are present on the mucous membranes of man and animals. Heine-mann¹⁵ obtained growth from 30 out of 45 samples of cows' milk that were drawn with strict aseptic precautions, the amount of inoculum used being 0.2 c.c. in each case.

The udders of six normal ewes were examined *post-mortem* for the presence of bacteria. Cultures were made from the interior of the gland tissue itself, from the milk sinus and the teat canal. The gland tissue proved to be sterile in each case, but in four instances a small number of colonies of various kinds were obtained both from the milk sinus and teat canal. The organisms isolated from the sinus were staphylococci, gram positive bacilli and cocco-bacilli and from the teat canal, staphylococci, streptococci and coliform bacilli.

Thirteen samples of milk were taken from normal ewes with the same aseptic precautions as were adopted in obtaining material for examination from cases of mastitis. A platinum loopful of sediment resulting from the centrifuging of 2 c.c. of milk was used as inoculum. In one case a growth of staphylococcus resulted and the remaining samples were sterile.

As a result of plating out on lemco agar 0.1 c.c. of milk from three ewes which had been prevented from suckling their lambs for a period of four hours the number of colonies obtained was five, three and two respectively. From three other ewes running with their lambs, the same quantity of secretion yielded three, three and nine colonies respectively.

Again, organisms were found to be present in the teat canal of seven ewes running with their lambs. The method of examination consisted in passing a blunt sterile probe into the canal after thoroughly cleansing the orifice, and then washing the probe in tubes of sterile broth. As a result, staphylococcus albus was obtained in four cases, a gram positive bacillus in two, whilst the remaining one yielded a mixture of staphylococcus and a coliform bacillus.

These results indicate that organisms are frequently present in the milk sinus and teat canal of normal lactating ewes. The majority of such organisms are excreted with the first part of the milk.

(To be continued.)

Clinical Articles

Amputation of the Tongue in the Horse.

By C. W. ELAM, M.R.C.V.S., D.V.H. and R. ISHERWOOD, M.R.C.V.S.,
University of Liverpool.

IN THE VETERINARY JOURNAL of March, 1926, Mr. Elam reported under "Clinical Articles" a case in which the amputation of the whole of the free portion of the tongue of a horse suffering from bi-lateral paralysis of that organ, was successful in restoring the animal to an unqualified usefulness. This case has been carefully watched from the time of the operation to the date when destruction was decided upon on account of chronic lameness in March, 1929. The animal was in excellent bodily condition at this date, four years after the operation.



FIG. 1.—Illustrating the absence of the end of the tongue.

The second case is that of a grey cart mare, aged twelve years. Unlike what obtained in the first case, the onset of the paralysis of the tongue was gradual, and it was only after three days that the tongue became immobile and protruded to the full extent. Here again there were no other symptoms of nervous derangement, and apart from the local symptom the animal appeared to be in perfect health. After seven days the free portion of the tongue was much swollen and there was ample evidence of commencing necrosis. An operation similar to that applied to the first case was performed, and six days later it was found

necessary to remove two upper and two lower molars, as they were causing injury to the remaining portion of the tongue in its swollen condition. In three days time the animal was able to take a little bran mash. The improvement in capacity to feed was a rapid one, and after five weeks from the commencement the animal was returned to work. No special after-treatment was necessary in this case, and the

animal did not receive preferential treatment in respect of work. The photographs were taken twelve months after the performance of the operation, and are evidence of the good bodily condition of the patient.

Points of interest in these cases are :—

(1) The origin of the paralysis. There was no evidence in either instance that the tongue had been roughly handled, nor was there any trace of inflammatory disease of the organ itself, nor of tissues in close proximity. The most likely cause seemed to be pressure due to hæmorrhage at the points of origin of the hypoglossal nerves. This would appear to be more evident in the first case, in which the tongue was described as "dropping out" during work. Rather against this opinion is the entire absence of other nervous disabilities which one would have expected in a paralysis of the tongue of central origin.



FIG. 2.—Illustrating the good bodily condition.

(2) The fact that the amputation of the free portion of the tongue almost immediately removed total inability to feed in these two cases goes to prove that it is not the paralysis of the tongue which is the chief hindrance to mastication and deglutition, but rather the swollen free portion which acts as a foreign body placed between the rows of teeth. The alternative to amputation therefore, is to subject the animal to the risk of extension of the necrotic area and of fatal septi-cæmia at the worst, and to lose a good deal of bodily condition at the best, with no better result in the end.

(3) The amputation of the free portion of the tongue can be undertaken without fear for the animal's usefulness in the future, and having regard to the success of the operation and the simple nature of its technique, it is inadvisable to delay the operation longer than the commencement of the necrotic process.

(4) Both these cases were of aged animals, and in the ordinary way suffering from this complaint they would have been destroyed as incurable, whereas at least five years of working life was added. In the case of young animals and pedigree stock the financial saving would be much more marked.

Canine Ringworm in Man.*

By ARTHUR WHITFIELD, M.D.,

Harley Street, W.

THE species or varieties of fungus causing what is broadly called ringworm vary in different countries. In France ringworm of the dog appears to be comparatively common and ringworm of the cat rare, whereas in England ringworm of the dog appears to be comparatively rare and ringworm of the cat common.

This distribution in the lower animal is naturally reflected in the variety which is communicated from the lower animal to man, and whereas I see a fair sprinkling of cases of ringworm derived from the cat (two cases in the first quarter of this year) it is many years since I have seen human patients infected from dogs.

In all these cases, both dog and cat, the variety is that classed by dermatologists as *microsporum*. The common human ringworm is known as *microsporum Audouini*, though there are a few rare sub-varieties known, that of the cat, first cultivated and named by Colcott Fox and Blaxall, as *microsporum felis*, and that of the dog, described by Sabouraud, as *microsporum Canis vel lanosum*.

Ringworm in the lower animal is of interest to the doctor as well as the veterinary surgeon, since it is obvious that an infected animal may form the source of one or more epidemics, and unless it be detected and dealt with the disease will not be stamped out.

It may be of interest to point out here that the intensely inflammatory ringworm in man, derived from the cow and horse, sets up an immunity in man and although this immunity is variable, sometimes enduring for years though on rare occasions being very transitory, it has some influence in limiting the spread and a notable one in rendering the treatment easier.

The *microsporum* varieties of ringworm on the other hand, set up inflammatory reactions of only the most trivial kind, and do not appear to call forth any marked degree of immunity, so that cure may be more difficult, and there is little tendency towards spontaneous disappearance of the epidemic.

The question whether the *microsporum* of the cat and dog after

* See also Professor Wooldridge's article, pages 306 *et seq.*

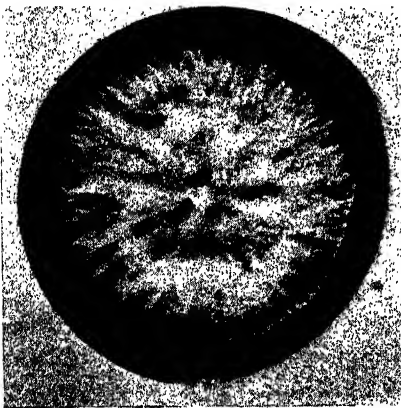
transference from the lower animal to the human being can then be transferred from one human to another can be answered in the affirmative. I have, during this year, seen a lady who was infected on the cheek by kissing her daughter. The daughter had been infected by her kitten, and all three cases were seen by me and the ringworm identified in the hair of the kitten's nose and that surrounding the eye.

A second question that arises is "Can microsporum of animal origin be either diagnosed as such or strongly suspected in man?"

The answer to this is in the affirmative.

All microsporum ringworms attack both the glabrous skin and the hairy scalp in man, though the attack on the scalp is practically limited to children below the age of sixteen. On the glabrous skin, however, the microsporum audouini (human) flourishes badly. It produces small red scaling areas, usually about a quarter of an inch in diameter, and practically never forms rings. These small patches usually die away spontaneously in a few days, and are very seldom found elsewhere than on the face, neck and upper shoulders.

Both microsporum felis and m. lanosum flourish readily on the glabrous skin, and form bold, erythematous, scaling and sometimes vesiculating rings, which are moderately persistent. When once they have attacked the hairy scalp I am unable to distinguish them from the human variety with any degree of certainty. I am in the habit, therefore, of asking where the ringworm was first noticed, and if the answer is that many rings were seen on the body at the beginning, I know I am dealing with an animal microsporum.



Tertiary culture from the skin of the human being infected with microsporum canis. Age of culture seventeen days. Medium, Sabouraud's Maltose "proof" Agar. Note the radiate appearance of the disc and the curly, wool-like surface.

The three cases lately seen by me, sent by Prof. Hobday, of ringworm of the dog communicated to the human being, may, perhaps, merit description

in some detail.

All three were young adult women veterinary students who had been dressing some infected dogs.

The lesions were on the forearms, were intensely irritable, and showed as bright red rings varying in size from a third to three quarters of an

inch in diameter. The centres of the rings were involuting spontaneously, and the horny layer was evenly ripped up into a scale with the free edge pointing towards the centre of the ring, and beneath this scale the reddened epidermis was just moist, but there was no sign of pus. The evenness of the desquamation is worthy of note as in most cases of ringworm of the skin the scaling or vesiculation is rather in a series of points resembling a ring of beads than in an even collarette. As this characteristic was present in all of the three cases, it may be of diagnostic significance in determining the source of infection.

Microscopic examination of the cigarette-paper-like scales revealed immediately a felt work of hyphae, the joints of which were of a narrow oblong shape. This is always the case with the *microsporum* varieties, but is found also in some parts of other ringworm growth on the glabrous skin.

Pieces of the scale were cut into small pieces with a sterile knife and implanted on Sabouraud's Maltose agar. Growth was visible in three days and developed rapidly in pure culture.

This extreme rapidity of growth of the animal *microsporum*s in artificial culture was noted by Sabouraud many years ago, and he named the fungi "*Cultures vivaces*." It is quite possible that this feature has some relationship to the extreme contagiousness of *microsporum* of the animal to the human being, the other factor being, in all probability, the ease with which the infected hair of the animal is shed.

As an instance of this extreme contagiousness I may cite the following history of a kitten and its victims noted by me in 1914.

A long-haired kitten was brought from a farm-house in Devonshire as a Christmas present for some children in Beaconsfield. It was taken to Exeter where it stayed the night, and on the following day it was taken to London, where it stayed a second night, and on the third day it was taken to Beaconsfield to the children. There was no contact with children in the Exeter and London houses, but in both places adults were infected on the glabrous skin, while in Beaconsfield all three children developed a profuse eruption on the glabrous skin, and an obstinate infection of the hairy scalp.

As regards the description of the culture the following features may be noted.

All the *microsporum* fungi give rise to "downy" rather than "powdery" cultures.

But whereas the human variety, "*microsporum audouini*" shows no radiations on the disc but merely a certain amount of folding, usually four or five deep radial folds resembling a hot cross bun, the *microsporum*s of the cat and dog show marked radiation (especially

that of the cat) and little or no folding. That of the dog also shows a rougher and more woolly appearance than that of the human, hence Sabouraud's name "microsporum lanosum."

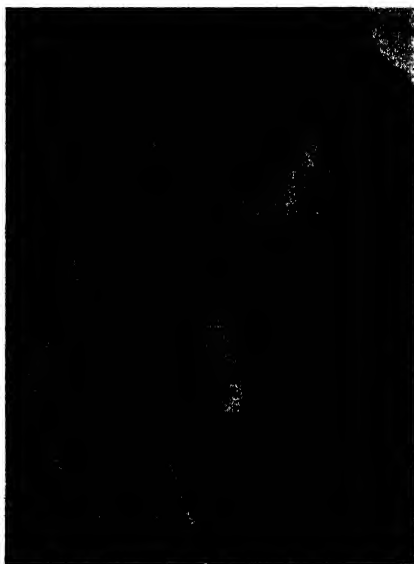
Ringworm in Two Dogs, Transmitted to Human Beings.

By G. H. WOOLDRIDGE, F.R.C.V.S.,

Professor of Medicine and Clinical Parasitology, Royal Veterinary College, London.

THE patients were two sealyham terrier bitches, the property of the same owner, from a kennel of upwards of a dozen dogs all affected with the same condition.

The history accompanying was that all the animals had been under treatment for a period of months by the local Veterinary Surgeon, who forwarded the above two animals to the College as interesting



cases. The condition in some had shown improvement, only to be followed by retrogression. The persons handling the animals had developed lesions on the arms, which, however, had readily yielded to treatment.

Examination showed both dogs to be in good condition, apart from the skin lesions. The latter showed, more or less all over the body but

* I am indebted for the photographs to Mr. J. W. Holmes, M.R.C.V.S., D.V.S.M., Clinical Assistant to the Medical Department.

particularly on the head and back, lesions varying in size from a three-penny-piece to a penny; much raised and hairless, with accumulated scabs. On removal of the scabs there were in some cases small sinuses from which could be expressed a small amount of blood-stained fluid. The skin between these areas was very scurfy. Diagnosis—ringworm.

The animals were in hospital for a period of five weeks, at the end of which time they were returned home for further treatment. Marked improvement was noted, but the skin was, as yet, by no means normal. The treatment adopted was the application of salicylic liniment (1—16) to the whole of the body during the first fortnight, and this was followed later by local treatment with vetiod and tincture of iodine.

An unfortunate but interesting feature was the fact that two lady students, who dressed the cases, developed lesions on their arms (see photos). Several dogs, which were in the infirmary at the time and were dressed by the same students, developed typical lesions of ringworm; which, however, readily responded to treatment with tr. iodi. A member of the secretarial staff using the same towel as the affected students also developed a ringworm on the face. The three were sent to Dr. Whitfield, who confirmed the diagnosis and demonstrated the parasite. Reference to these cases is made in Dr. Whitfield's contribution.*

Linguatula Serrata in the Nasal Cavity of a Dog.

By NOEL PILLARS, F.R.C.V.S.,

IN this country at least it is comparatively rare that one has an opportunity of observing adult linguatuliasis in the living animal. The following notes of such a case which I saw with Mr. P. T. Lindsay, M.R.C.V.S., on April 28, this year may therefore be of some interest. The subject was an old English sheep dog which had been purchased and brought into town in August last year. There was a small abrasion on the wing of the right nostril caused by constant rubbing along the floor. Marked sneezing took place when the animal frisked and galloped about. There seemed to me to be a strong desire to rub the nose on the clothes of anyone within reach. No epistaxis was observed, and two samples of mucus sneezed on to the kennel partitions were negative on microscopic examination. On May 4, however, a small string of material taken from the right nostril contained numerous eggs. They were amber coloured and the average measurements of a series were $100 \times 63 \mu$. They are shown in Figs. 1 and 2, which are low and high power views respectively. On comparing them with eggs actually taken from *Linguatula serrata*, no differences could be detected, and as

* See Dr. Whitfield's article, pages 303 *et seq.*

apparently there is only one tongue worm in this country, it is suggested that this was the species in the present case. Fantham, Stephens & Theobald (1) give the measurements of the eggs as 0.09μ . in length, and 0.07μ . in breadth. This is an error, and should, apparently, read .09 mm. in length and .07 mm. in breadth, which it will be seen is equivalent to 90 and 70 μ . respectively ; that is to say, a little more rounded than in this case.

An attempt was now made to illuminate the nasal cavity, but it

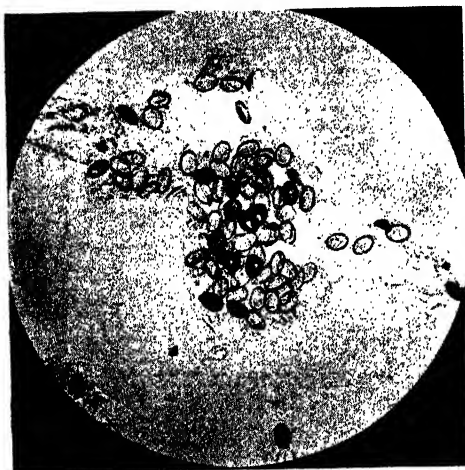


FIG. 1.—A group of pentastome eggs in nasal discharge. $\times 40$.

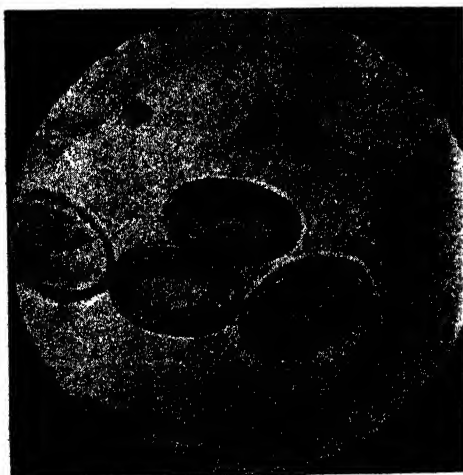


FIG. 2.—A group of pentastome eggs in nasal discharge. $\times 220$.

proved to be both difficult and unsatisfactory. On May 6, twenty drops of pure chloroform were instilled into the affected nostril. It was not easily carried out in a thorough manner, but caused marked sneezing and a large amount of froth to come from the nostrils and mouth. The parasite was, however, not expelled.

In the absence of exact knowledge as to the position of the "worm," attempts at snaring or surgical intervention were thought to be undesirable at this juncture.

On May 8 the patient was chloroformed and a mixture of equal parts of dilute acetic acid and water was dropped down the nostril. About a cubic centimetre was used. There was violent sneezing, but no visible result. After waiting a few minutes the dose was repeated and was again negative. The next day it appeared that the injections had caused considerable irritation of the

mucous membrane. No eggs could then be found in the fæces. By May 12 no parasite had been seen and two samples of mucus obtained from the floor were negative. The irritation was now less, although there was a little sneezing and rubbing of the wing of the right nostril. On May 20 the nasal discharge had ceased and so had the desire to rub the nose, but there was an occasional sneeze.

It now appeared likely that the parasite had left the nasal cavity, passed into the stomach and so gained the exterior in the fæces. A search had been made for it and no eggs were discovered on microscopic examination. In view of the fact that eggs may infect man and so give rise to larval forms in the liver and other organs, it became a question of some importance to be absolutely sure that the dog was no longer dangerous in this respect. Microscopic examinations of swabs from the nostrils were made every other day for twelve days, and as they were all negative the animal was returned to its owner. It shows no signs of nasal irritation at the time of writing (July 10).

The points of interest seem to be the difficulty of judging the results of treatment and the responsibility of the practitioner in deciding that a treated dog is no longer a menace to man. Perhaps the first obstacle can be overcome by complete isolation on boards and careful examination of all the fæces passed.

With regard to the safety factor, it is extremely difficult to state anything very definite, because there are many gaps in our knowledge of the life history of the parasite. If a "worm" (or "worms") is expelled and if the symptoms and eggs disappear it has to be remembered that there are many records indicating that the life cycle may take place in one host. Thus the adult has been found in the nasal cavity of ruminants, which harbour the larvæ in their internal organs, and early developmental forms have been reported from carnivora, the hosts of adult linguatules. I do not think, however, that auto-infection by swallowing eggs from the nasal cavity often occurs in the dog, because in the few *post-mortems* made on animals harbouring adults, larvæ have not been found, and also because the egg appears to require some time in the outer world. There are many intriguing possibilities in the life history but they are outside the scope of the present note.

REFERENCE.

- (1) Fantham, Stephens & Theobald. *Animal Parasites of Man*. London, 1916 p. 524.

Translations

The Treatment of Poll Evil in the Horse.*

By P. P. TIMOFEEFF,

Surgical Dept., Clinic of Kaluga (U.S.S.R.).

THE writer mentions the various forms of Poll Evil met with, Bursitis, which may be (1) serous and sterile, such can often be cured by a blister; (2) infected bursitis, usually leading to fistula formation and Necrosis of the lig. nuchae. The usual treatment—as represented by laying open the tracts, and with abscesses, the making of counter openings, drainage, and antiseptic irrigation, is usually a long and tiresome one, and does not always cure the condition.

The writer began to use the radical operation method of Prof. Mirzel, which consists of section and removal of all diseased ligament nuchae and destruction of the subligamentous bursa. He has also taken up the method of local vaccination of Besredka by which the time required for healing is considerably shortened. Five case records are mentioned, of which four which were not responding to purely surgical handling, quickly improved after local autovaccination. Vaccines were made from pus obtained from the cases and were applied in this way. 1-2 ccs. of the culture filtrate were injected into the walls of the tract and 20-30 ccs. of the same filtrate were poured into the diseased cavity.

Repetitions on subsequent days took place as required, up to 5 doses in all, spread over 12 days.

The writer concludes with these dicta:

- (1) Ordinary surgical treatment often effects no cure.
- (2) The best surgical technique is that of Mirzel.
- (3) Mirzel's technique combined with local autovaccination has given him surprising results. Suppuration is checked and healing follows quickly.
- (4) Local autovaccination alone does not give successful results.

* From "Berliner Tierärztliche Wochenschrift," 1928.

A Note on Besredka's Theory.*

WITH reference to diseases primarily affecting the skin Besredka asserts that the skin alone is the seat of the lesion and therapy must be applied locally to the diseased part.

Local Vaccination does not influence the Body as a whole; the

* From Seuchen-bekämpfung.

autogenous or Stock vaccine used does not act as an antigen, nor are antibodies formed in the blood. If the vaccine is introduced into the blood stream, it may in some local diseases have some beneficial result but not nearly so much as if it had been applied locally. In cases of local vaccination for such lesions as Poll Evil the vaccine operates in effect as a specific biological disinfectant thus having great advantage over the ordinary chemical antiseptics which are non-specific and are also apt to injure the body cells ; whereas the vaccine both checks the increase of the infection by acting on the organisms and also gives a power of resistance to the hitherto healthy tissue immediately surrounding the lesion.

For this reason, in practical application, the vaccine is most favourably applied direct to the lesion as a culture filtrate and also injected by syringe with the tissue immediately bounding the lesion.

Besredka says " Local Infection—Local Vaccination. Every irritant agent has its special cell ; every cell has its special immunity."

Reviews

The Way of a Man with a Horse. By LIEUT.-COL. GEOFFREY BROOKE, D.S.O., M.C. With Veterinary Notes by Colonel A. G. Todd, R.A.V.C., D.S.O., and a chapter on Pigsticking by Lieut.-Col. Arthur Brooke, D.S.O., M.C. Pp. 288. With over 90 illustrations. Published by Seeley, Service & Co., Ltd., 196, Shaftesbury Avenue, London. Price 21/-

The name of Colonel Geoffrey Brooke, as an author, attached to any work connected with the horse gives an assurance of a multitude of readers.

The present book has interesting matter on every page. It contains chapters on Buying a Horse, Stable Knowledge and Routine when one has made the purchase, Riding, Riding to Hounds, Show Jumping, Management of Difficult Horses, and practically everything worth knowing connected with the horse in health.

The portion written by Colonel Todd (pages 102-161) is full of practical hints, although in some instances the details which are given would be better left to be prescribed by the veterinary practitioner in attendance.

The illustrations are certainly excellent, and we recommend the book to the notice of every sporting practitioner and veterinary student.

The Law Relating to Medical, Dental and Veterinary Practice. By FRED. BULLOCK, LL.D., Barrister-at-Law. Pp. xvi. 317. Published by Messrs. Baillière, Tindall & Cox. Price 12s. 6d. net.

Dr. Bullock, who is the Registrar and Secretary of the Royal College of Veterinary Surgeons, and a Barrister-at-Law, knows the legal aspect of the three branches of medicine, to which this book is dedicated, inside out.

It is an excellent idea that he has thought good to put down on paper a summary of the "Law Relating to Medical, Dental and Veterinary Practice" in such a concise and readable manner as is to be found in the present volume.

The book deals with the Statutes, Charters and Ordinances which rule the professional aspect of medicine, and in some 317 pages Mr. Bullock has compressed an immense amount of legal knowledge in readable form.

The book is one which we are quite sure will speedily run through its first edition, as it caters for so many different wants; not only in the medical, but also in the legal, world; and no barrister can possibly consider his library to be complete until a copy is found upon its shelves.

The part which is specially indicated as belonging to the Veterinary profession is only a comparatively small chapter, but this only deals with that which *specially* concerns the veterinarian, and in each chapter of the book there is plenty to be found from which one can glean something which is pertinent to the position of the members of our profession as professional men.

To everybody who is interested in the "Law Relating to Medical, Dental and Veterinary Practice," this book is an essential companion, and one which no Veterinarian in busy practice can afford to be without.

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MAJOR-GENERAL SIR FREDERICK SMITH, K.C.M.G., C.B., F.R.C.V.S.
Late Director General of the Army Veterinary Corps.

THE VETERINARY JOURNAL

Editor :

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AUGUST, 1929.

In Memoriam.

MAJOR-GENERAL SIR FREDERICK SMITH, K.C.M.G., C.B., F.R.C.V.S.

By the death of Sir Frederick Smith the British veterinary profession has lost its greatest historian and one of its most earnest workers.

To write down all that we owe, directly and indirectly, to his individual effort would fill a very large volume, but the solid foundation upon which the Royal Army Veterinary Corps is now established will always remain as a monument to his memory, for Major Fred. Smith was one of those who were most prominent in its formation as a separate Departmental unit.

To every student in the various British Veterinary Colleges who has reached his second year, Smith's Physiology is an essential text-book, and authoritative articles from his pen have for many years covered a wide range of clinical subjects in each of the veterinary periodicals; and when he could be persuaded to lecture or demonstrate before any of the Veterinary Associations those who were responsible could always be assured of an appreciative and attentive gathering. His name is so well-known to Veterinary Science in every country of the world that no more Editorial note is necessary.

At the funeral service, held on Wednesday the 31st of July, at Golders Green Crematorium, there was, by his own request, no religious ceremony; but as the mourners and friends assembled the organist played Sir Frederick's favourite pieces—"The Moonlight Sonata," Part 1, "The Largo"; "The Flowers of the Forest"; "Mary

of Argyll " ; and—as the coffin (which was covered with the Union Jack and had placed on it the General's cocked hat and sword, with decorations, resting on a cushion) entered the chapel—the Regimental March of the 12th Royal Lancers.

The chief mourners were Lady Smith, Mrs. Symonds, and Dr. and Mrs. Poyser. Others assembled to pay their last respects included : Major-General H. T. Sawyer (Director General of the Royal Army Veterinary Corps), Major-General Sir John Moore (representing the National Veterinary Association), Lieut.-Colonels Mosley, Pallin and Argyle, Majors Glynn Lloyd and Rees Mogg, Sir John McFadyean, Principal Hobday, Professors Wooldridge and Hare, and Mr. Henry Gray.

By the special request of the General, when on his deathbed, Dr. Fred Bullock, the Registrar and Secretary of the Royal College of Veterinary Surgeons, conducted the final ceremony ; as the music ceased he rose and said :—

" The task I now undertake is not of my seeking. It is at the special request of my friend Sir Frederick Smith that I am to say a few words to those friends of his who should assemble here to-day to pay their last tribute to his memory. It is at his request too that there is to-day no religious ceremony of any kind. It was, I think, because he had a super-sensitive apprehension lest anything savouring of insincerity should attach to this ceremony ; for a man who was always so self-contained and self-controlled, who had so great a love for the beautiful and the true, and above all, a man of such spartan self-discipline, cannot be said to have been irreligious. The music we have enjoyed was chosen by himself for the reason that he loved its beauty. He was moreover, though self-taught, an artist of no mean merit. If he saw a picture that he liked, he felt impelled to make it his own by copying it ; and his brush, like his pen, was seldom idle.

" But his great merit was his devotion to the advancement of his profession, and in that respect it might well be said of him : ' The zeal of his profession hath eaten him up.' He was always an enthusiast ; from his student days to the end of his long professional life he continually spurred himself on to new tasks ; his interest and zeal never flagged. Even on his death-bed he continued to write, and the finishing touches to his last article, a contribution to the new Journal of the R.A.V.C., were made by the palsied and trembling hand of a dying man. Every ounce of his energies, every day of his life, every thought, every aspiration, were devoted to his beloved profession ; to broadening, and deepening, and strengthening, the foundations, and doing his share towards building up the edifice of veterinary science. This he did often under the most adverse circumstances, in face of difficulties that would have effectually daunted a lesser man.

" This is not the occasion, nor am I the person, to appraise his merits as a student, as a researcher, as a teacher, or as a historian, but I make bold to say that when the story of his life is told (as I trust someday it will be told) it will be found that in the roll of men who have by devotion to duty, by sterling character, by sacrifice of personal ease, by continuous labour and

study, contributed to the general stock of knowledge in this particular branch of science, the name of Major-General Sir Frederick Smith will stand in the front rank.

" It was given to me in recent years to know him more and more intimately, and he will always remain to me, with his gracious charm of manner, as the personification of all that is meant by ' an English gentleman.' He belonged to no sect, and gave credence to no creed so far as I am informed ; yet—if a high ideal of honour, a scrupulous regard for truth, a deep devotion to duty, an unwearied and altruistic pursuit of knowledge ; if a generous thoughtfulness for others, courage to pursue and overcome in face of manifold difficulties ;—if these are characteristics which are to be admired in a man—then General Sir Frederick Smith's character must command our unstinted admiration.

" But it would not be his desire to seek from us any such attitude to his memory. What he would crave for, if I may so far venture to express his desire, would be your understanding and friendly appreciation of the value of his work, during more than half a century, for his profession. And that desire is not unreasonable. Like all other human institutions, the veterinary profession is the sum not only of what its present members are and achieve, but of the lives and works of those of the past : and not only so—in the same way as the tree and its fruit are one, and interdependent, so a profession, which is alive and growing, is made up of, and includes, not only its past and its present, but in a very true sense its future also. The life of a worker like Sir Frederick Smith, which has become part of his profession, and has helped to make it what it is, is also making it what it is to become. There is no death for him in that respect.

" Among the vast mass of papers he left behind him, I found the following, written during the present summer :

" ' I do not know how long I shall last, but I do know that I have had such a miserable time during the last two months—daily losing ground, with a diminished daily output of work—that I shall be very pleased to set my face towards the west, and tramp out into the unknown.' He died as we have said, still working. He died with the supreme consolation to him that the tasks he had set himself were well and truly done, and that others would benefit from his labours.

" He was in touch with most English-speaking veterinary surgeons of note throughout the world, not only of his own generation, but especially among the younger members of his profession. He learned from them and they from him. He was especially kind in his encouragement of young men and he received the greatest respect from men of his own age. In a letter received the day of his death from Dr. Fish, the Director of the New York State Veterinary College, there is a passage which I think I may very properly read to-day. Dr. Fish, after thanking Sir Frederick for valuable advice and assistance, says : ' It is difficult to close this letter, since it may be the last one you may be able to receive from me. I am thankful for the contact we have had in our correspondence, and regret more than I can say that it must necessarily terminate. I, more than others of the profession, am grateful for the example and inspiration of your life's work. Your memory will not fade. The veterinary profession is a better profession because you have been included in it. All will grant that no individual member has done more than you to raise the standard ; and now, as the campaign closes, all I can say is—Goodbye and Farewell ! '

" And so he signs himself ' Your devoted friend, P. A. Fish.' *

" These words from across the seas have, I am sure, found an echo in the heart of everyone present. They are words which express what many other correspondents of his have written ; they are words which our friend would have been glad to hear."

Turning at this point to the bier Dr. Bullock concluded as follows :

" Now we obey his last behest.

" Now we commit, at his request, his body to the flames. We bid good-bye to the shell which housed his ardent spirit. But the profession which he loved, with which he identified himself, will, as long as it lasts, bear the impress of his life and work and character ; and we who knew him, and loved him, will ever cherish with gratitude the memory of all that was best in him."

While these sentences were being pronounced the coffin slowly disappeared through the gateway to the incinerarium, and the organ took up the strains of the Dead March in Saul.

After the ceremony was completed the ashes were brought to the Royal Veterinary College for disposal in accordance with the dying wishes of the General, who wrote on the 15th of July : " The Governors will be asked in due course to let my ashes lie in an ordinary jar in the Museum. I should like to think that I am not to be separated from the work I have loved so well."

General Articles

VETERINARY EDUCATION WITH PARTICULAR REFERENCE TO STATE SERVICES IN THE TROPICS.

By R. DAUBNEY,

Assistant Chief Veterinary Research Officer, and

R. W. M. METTAM,

Veterinary Research Officer, Kenya Colony.

(Paper presented at the Pan-African Conference, Pretoria, Aug., 1929.)

There is little doubt that in the past the authorities in control of veterinary education have not devoted to tropical veterinary science that special attention to which its importance, as a sphere of professional activity, most certainly entitles it. Some years ago it was possible to obtain, in at least two of the educational institutes in England, short post-graduate courses in Tropical Veterinary Science and in State Veterinary Medicine, which combined a fairly extensive amount of practical laboratory work with lectures in the special subjects. These courses—in particular the one held by Sir John McFadyean at the London College—were well attended by members of the colonial services, the home municipal services, army officers, and by candidates for such posts. At the same time, however, the fees charged were inadequate to cover the cost of the instruction given—at least at the London College—and during the period of post-war disorganization it was found necessary to abandon them on the score of expense. Numerous government commissions have, in the last few years, repeatedly drawn attention to the need for improvements in the training available to veterinarians entering the services of the colonies, and the recent * Lovat Committee on veterinary services has further stressed the urgency of such measures, and the necessity for the provision of refresher courses for colonial veterinary officers, who will be given study leave in order to attend.

It is of importance to decide in what respects the present professional equipment of the veterinarian destined for the colonial service is deficient, and in what manner the necessary improvements can best be effected. Is it possible to effect the necessary improvement solely by means of short periods of intensive post-graduate training, or is it not possible, also, that the time has arrived to review the present curriculum

* Colonial Veterinary Service, Report of a Committee appointed by the Secretary of State for the Colonies. London, January, 1929.

of the graduate course, and to change its orientation towards what is now becoming the most important side of veterinary activities? One of us has recently advocated the remodelling of the present graduate curriculum, with the object of effecting improvements in general training, in order to equip graduates for the State Services. The alterations suggested are chiefly concerned with the provision of a more adequate training in laboratory work both in veterinary and pre-veterinary subjects. The difficulties with regard to fitting in additional laboratory work in veterinary subjects during the present four-year course, and the added difficulty of increasing the amount of practical work in pre-veterinary subjects, is thoroughly appreciated, and was discussed at length in the article already referred to. Scientific knowledge is advancing so rapidly that it is becoming increasingly difficult, in the comparatively short period of a student's life allotted to professional education, to equip him with an all-round training in such a large group of general scientific and special subjects as is required from the modern veterinarian or medical man. There is no doubt that an identical problem has much exercised the minds of those in control of medical education, both in Great Britain and in the United States of America, and in a few instances a serious and, in our opinion, a successful effort has been made to effect the necessary changes without increasing the curriculum to the unwieldy length of medical courses in some of the Southern European States. Indeed, the method adopted by these medical schools in England, notably of the Cambridge and Liverpool Universities, appears to the writers, after a consideration of all possible alternatives, as the only solution of our present difficulties. The necessary expansion in pre-medical work has been effected by raising the standard of the entrance examination, and by confining the teaching in the medical course to advanced instruction and practical work in these subjects. Thus the candidate is required to pass examinations corresponding to the first parts of M.B., physics and chemistry before registration. Further, although it has been possible in this way to combine some slight economy of time with improved instruction in pre-medical subjects, it has been found necessary, in order to permit of the full expansion of the actual medical training, to institute a short fourth term, which is held at the commencement of the long vacation. In America similar results have been achieved by increasing the preliminary high-school or university requirements for admission to the best medical schools, and by increasing the number of hours per day required of the student during the terms; which, incidentally, are somewhat longer than those of English Universities.

It is certain that any professional committee, appointed to review problems connected with veterinary education, will be faced with the

necessity of recommending some means of effecting similar changes in the veterinary curriculum ; and, although the benefits of well-organized post-graduate training are undoubted, it is the conviction of the present writers that not until these advances have been made can students reap the full advantage from these short periods of intensive post-graduate training.

The question at once arises as to whether these recommendations are practicable in view of certain existing handicaps to veterinary colleges, such as the possible intimidation of intending candidates by a more exacting standard of preliminary educational requirements, and the difficulty of setting up a really sound organization for the adequate teaching of pre-veterinary subjects in institutes already financially embarrassed. The whole problem has already been discussed by one of us, and a solution has been offered in the shape of a suggestion that teaching up to the last two years should be handed over to an existing university, preferably one which has modernised its medical teaching. Cambridge University was cited as the most suitable institution, and the present course for the pathological tripos as an ideal curriculum for the earlier years ; the veterinary college would then become a finals school teaching special pathology, bacteriology, protozoology, and related subjects, together with clinical medicine and surgery in the two final years. In order to bring the training in these subjects up to the required standard, it will no doubt be necessary to work the student harder, and to compel him to sacrifice part of his long vacation to a fourth term. The institution of these changes would not only effect considerable economy, and allow of greater expenditure upon the important teaching of the final two years, so that here a really efficient organization could be maintained, but would also ensure the recruitment of candidates of the highest mental calibre. It is our conviction, and that of university teachers in medical schools with whom the question has been discussed, that there would be no shortage of suitable candidates. Students would regularly be diverted to the veterinary profession from two sources—from the natural science tripos group, and from the pathology tripos—and there can be no doubt that one of our problems in the past has been to attract a sufficiency of candidates of this class to fill posts, more particularly on the research side. The findings of the committee on colonial veterinary services are in complete agreement with the suggestions advanced in this and previous papers. With regard to the question of raising the standard of preliminary educational requirements and including in them preliminary training in the pre-veterinary sciences, the report states that " Many witnesses emphasised that, in order to avoid the cramming in pure science which is usually

necessary during the undergraduates' first year at a veterinary school, there should be a pre-registration course in science which would lengthen the syllabus by one year." In considering the question of recruitment and training, a recommendation is made that holders of a degree in pure science, or the equivalent of part one of the Cambridge natural sciences tripos, should be encouraged to enter the colonial veterinary services; and practical assistance is here offered by the provision of educational scholarships. It is evident, then, that the committee was impressed by the same deficiencies in the present curriculum which impelled one of us (Daubney*) to offer the suggestions for reorganization included in previous articles and briefly referred to in this paper.

Granted that the improvements in the graduate curriculum already suggested are made, there still remains the problem of equipping the graduate for special work in the tropics. As the Lovat Committee has pointed out, there is at present no provision for post-graduate courses in tropical veterinary science in this country, while, on the other hand, in the colonial medical service the importance of post-graduate study in tropical medicine is recognised, and an officer's final selection for appointment is dependent upon a satisfactory report on his progress during the special course of instruction at one of the recognised schools of tropical medicine. Attendance at a four-months' course is compulsory for French veterinarians desirous of working in the French colonies and protectorates. May we quote paragraphs 43 and 44 of the report of the committee on colonial veterinary service? "At present the newly-appointed Colonial Veterinary Officer arrives in a British Colony with an inadequate knowledge of animal diseases peculiar to the tropics, and their treatment and prevention. We fail to see how he can be of any real practical value to his Service until he has had some specific instruction in those animal diseases which are to be met with in the Colonies. We feel strongly that without such instruction he is handicapped from the commencement of his career, and that unless he has a keen scientific interest he runs the risk of never properly mastering the first principles of tropical veterinary science. In our opinion a newly appointed officer should not assume his normal duties in the field until he has familiarized himself with his future work by means of the following supplementary training:—

1. (a) Comprehensive courses in protozoology, entomology, and helminthology.

* 1927, "Veterinary Research in the Colonies." *Veterinary Journal*, London, LXXXIII. pp. 534-547.

1928, "Veterinary Education." *Ibid.* LXXXIV. pp. 325-332.

(b) More advanced work in pathology, bacteriology, and bio-chemistry.

(c) Courses in animal nutrition, animal genetics, tropical hygiene, and tropical agriculture.

(d) The application of these sciences to specific problems of animal disease and epizootiology.

2. Training, chiefly practical, at a laboratory in which tropical diseases of animals can be seen under circumstances approximating more nearly to normal conditions.

“The special courses referred to under (1) could most easily and economically be arranged in Great Britain. But the second and practical portion of the training could be satisfactorily given only in a tropical country. It would be of undoubted advantage if all newly-appointed officers could receive clinical instruction at some well-equipped centre abroad, in order to complete their initial training before assuming their normal duties. We fear that this is impossible, in view of the vast extent of the Colonial Empire. We recommend, however, that if the Colony to which an officer is posted has a veterinary laboratory he should receive a course of instruction of about three months' duration before proceeding to his up-country station. Where no veterinary laboratory exists, he should if possible be sent for such training to a neighbouring Colony possessing the necessary facilities.” In our opinion they summarize the situation as it is to-day, and offer solution of difficulties in the future.

We may take it as fairly certain that the recommendation of this Committee as to the creation of a post-graduate School of Tropical Veterinary Science, probably in London, will be given effect at an early date, and it remains briefly to consider the functions of such an Institute and various possibilities as to its exact organization. In the first place one must not lose sight of the fact that there are two classes of colonial worker for which it is desired to cater—the research worker and the field officer. The pure teaching of the school will necessarily be concerned with equipping the field officer on first appointment, and with providing refresher courses for the field officer on leave, and we propose to deal with this side of the school's activities first.

The chief course of instruction at the school then will be a five or six months' course terminating either in a special examination or in a specially arranged post-graduate examination of the Royal College of Veterinary Surgeons, such as a D.V.S.M., in tropical medicine. There might be a stipulation by the Colonial Office that if an officer appointed cannot take the course and the examination before first proceeding to duty, he should take it during his first home leave. The refresher

course for more senior field officers will cover much the same ground as the course for juniors, but will be mainly concerned with bringing up to date the officer's knowledge of special tropical diseases, and acquainting him generally with the material progress made by research in recent years. Such a course would assist the field officer to collate the results of his tropical experience, and to choose subjects suitable for a thesis for the higher university degrees, or the F.R.C.V.S. The two courses will cover the same ground, and it is necessary only to indicate the scope of the various divisions.

The following sections are tentatively proposed :—

Bacteriology.—The special bacteriology of tropical diseases such as the hemorrhagic septicæmias, *Salmonella* infections, *Actinomyces* and other *Streptothrix* infections, contagious pleuro-pneumonia of bovines, the contagious pneumonias of sheep and goats and epizootic lymphangitis. Special features of certain bacterial diseases in tropical countries, e.g. anthrax, blackquarter and related anærobic infections, contagious abortion, ulcerative lymphangitis. Practical laboratory work in the bacteriology of these diseases.

Protozoology.—The intestinal protozoa of domesticated animals. The blood-borne protozoal infections—Hæmosporidea, Flagellata. The spirochæte and *Spiroplasma* infections.

Helminthology.—Parasitic worms in tropical countries. Parasites peculiar to the tropics. The economic importance of the different species, their life histories, the control of infestations under tropical conditions, and methods of anthelmintic treatment.

Entomology.—The insect and arthropod vectors of disease. Life history, distribution, and control. The parasitic insects and arthropods.

The Filtrable Viruses.—The etiology of such diseases as the pox group, rinderpest and fowl plague, contagious ecthyma of sheep, contagious papillomatous stomatitis of sheep, contagious pleuro-pneumonia of goats, rabies, foot and mouth disease, swine fever (tropical form), horse-sickness, blue-tongue, and infectious anæmia of horses.

Rickettsia Diseases.—Heartwater.

Epizootiology.—A course of lectures on this subject, and its general and special application in the control or eradication of diseases of economic importance.

Plant Poisoning.—The recognition of the commoner poisonous plants, their distribution, the symptoms produced by feeding ; etiology of certain diseases that are known to be caused by the ingestion of poisonous plants.

Nutrition.—The pathologic conditions associated with vitamin or mineral deficiencies, experimental data. The distribution of deficiency diseases. The common food grasses and grains. Principles of animal feeding.

Genetics.—Genetics of domestic animals. Value of genetics in improving breeds, heredity, inherited resistance to disease. Sterility, diseases of the reproductive system.

Throughout the course insistence will be laid upon practical laboratory work, with the object of enabling men to deal with problems in the field in a systematic fashion. May we be permitted to reiterate that one important result of this type of training will be the amount of hitherto neglected material that will then reach the research worker?

It will be evident that to carry out the suggested programme with thoroughness, a large and expensive staff will be required unless, in addition to the whole-time staff, the services of specialists can be obtained as visiting staff. The Institute, therefore, must be located in a centre where the services of such visiting staff will be available. In the circumstances, either Cambridge or London is indicated as the most suitable site for the Institute. Consideration has been given to the possibility of adapting one of the existing Colonial Research Institutes to the purpose, and in particular Onderstepoort, with its teaching organization, was considered, but there are overwhelming advantages to be gained by placing the school in Great Britain. There the school would be more or less central. Officers on leave would benefit by the change to a healthy temperate climate. The specialist visiting staff, which would be available, could not be found within easy reach of any institute in the colonies. The course given would lead to a degree or diploma of either Cambridge or London Universities, which would be accorded world-wide recognition; while senior officers and research workers would be able, under the teaching of the school, to proceed to a senior degree of those Universities at which they were educated.

The permanent staff of the institute will, no doubt, be selected from men experienced in tropical veterinary research, and it is the conviction of the writers that it will be necessary for the staff to continue active research work in order that the standard of their teaching shall not suffer. Original research maintains the teacher in close touch with current progress in all sections of the subject he is teaching, in addition to stimulating in him an enthusiasm and keenness which is inevitably reflected in the quality of instruction imparted to his students. It is well known to people in touch with scientific education and perhaps, particularly so, to those whose concern has been veterinary education,

that failure to provide facilities for original research in schools leads rapidly to a marked deterioration in the quality of the teaching. There is a wealth of material of fundamental importance to colonial veterinary science that can be investigated in an institute at home, and no doubt the permanent staff of the school will also be given facilities to visit the colonies and carry out investigations of disease problems *in loco*. The staff of such an institute is in a particularly favourable position to carry out fundamental or long-range research of the type that correlates problems in different colonies, and enables one to realise the essential similarity of problems which at first sight may have appeared more or less unrelated. The worker in such an institute acquires a perspective which is often lacking in the isolated worker in the colonies. Particularly favourable from the research worker's point of view will be the situation of the staff with regard to access to scientific literature, and the advantages of working in a recognised centre of scientific research are in this respect hardly to be overestimated. Intercourse with other scientific workers, and freedom to discuss collateral subjects with specialists in their particular spheres, is a privilege of the centralised worker that is not enjoyed by his colleague working in colonial institutes, which are generally understaffed. In centres such as London the pure biologist, the physiologist and the chemist, are available for consultation by the worker who in the course of his investigations is in need of information or expert advice upon any of these subjects.

Certain diseases are so widespread throughout the tropics, that the local investigator is faced with extreme difficulty in obtaining a supply of susceptible animals for experimental purposes. Even though he is able to obtain a limited number of animals supposed to be susceptible to the particular disease under investigation, he is constantly faced with the possibility that some of the supposedly susceptible animals have at some time contracted the particular disease in a mild form and acquired immunity. This possibility has always to be considered when interpreting the results of experiments carried out under such conditions. There is a further point that arises, particularly in connection with the insect-vected diseases such as the piroplasmoses, from which recovery is incomplete; the same insect host may transmit two or more of these diseases, and the same definitive host may, although apparently healthy, be capable of infecting a tick with two or three species of parasites. Under these circumstances the difficulty of establishing pure-line infections for research work, either in the tick or in the vertebrate host, will readily be appreciated. The investigator outside the tropics has at his command large numbers of experimental animals that are known to be susceptible. Even the limited amount

of work upon East Coast Fever, and other related small piroplasms, already carried out by a few investigators in Europe, clearly indicates that research in such centres is essential if the life-histories of this group of parasites are to be worked out and thoroughly scrutinized. Sir Arnold Theiler is in complete agreement with this view and has given expression to a similar opinion on several occasions.

Workers in a central institute will be in a position to specialize and, apart from definite hours allocated to teaching duties, will be able to carry on research unembarrassed by routine duties such as diagnosis.

Laboratory workers in the colonies are frequently unable to carry investigations to a final solution, owing either to the difficulty of obtaining ready access to scientific literature or to the need for consultation with some other specialist whose services are not available. Research workers are usually anxious to complete investigations while they are on home leave, but they often experience difficulty in the choice of a centre for work, and in the selection of the right people to whom they should apply for advice and assistance. Accommodation would be available at the institute for workers on leave from the colonies, and the experience of the permanent staff and their knowledge of the facilities available in London and elsewhere should prove of the greatest value to the worker from abroad.

The Institute would normally function as the principal training centre for young research workers who would eventually be drafted into the Colonial Service, and it is proposed to institute scholarships with the object of attracting young men to the colonial veterinary services, particularly on the research side. The director of the institute should supervise the training of these scholars, and direct their efforts towards the solution of problems of economic importance to the colonies.

In the report of the Iovet Committee suggestions are made for the permanent staff, which includes a director and three senior officers, together with temporary and visiting staff. We are in general agreement with the recommendations made in those sections, 48 to 54 of this report. It has, however, occurred to us that in addition to the nucleus of permanent staff and the junior scholars undergoing training, both the affairs of the institute and of veterinary research in general would benefit if some provision could be made for the inclusion of a few more senior research workers. We refer here to men of the type that often receives Senior Beit Memorial Fellowships or special grants from scientific bodies. It is probable that one such Fellowship of the value of £700 per annum, will be provided by private subscription in Kenya, and there are reasons for hoping that each Fellowship, financed privately, will be the means of obtaining a similar grant from one of

the bodies interested in tropical research. The proposal is, that these whole-time research fellows should devote their studies to the solution of a particular problem or to a group of related problems, working partly at the central institute and partly in the field, or in colonial laboratories where material for investigation is available.

Referring back now to our earlier consideration of the improvements that might be effected in the ordinary graduate course, it is quite evident that improvements in graduate training will be reflected in the capacity of graduates to benefit by intensive post-graduate courses, but at the present moment, one is more likely to achieve rapid results by the post-graduate method. The profession is invited to support whole-heartedly the recommendations of the Lovat Committee, and above all to remember that when the educational reforms suggested have been effected, it will still be necessary to press for the early adoption of the recommendations dealing with improvement in the prospects and conditions of service of the profession in the colonies. If the promises of that report with regard to improvement of the status of the service are not realised, it will be found that, in spite of improved educational facilities and of such inducements as scholarships, there will still be a shortage of suitable candidates of the right calibre.

SOME ATTEMPTS TO OBTAIN, BY MEANS OF PHYSIOLOGICAL EXPERIMENTS, AN OBJECTIVE BASIS FOR AN OPINION AS TO THE CRUELTY ALLEGED TO BE ATTENDANT ON THE JEWISH RITUAL METHOD OF SLAUGHTERING CATTLE.*

By PROFESSOR A. V. SAHLSTEDT,

Principal of the Veterinary Institute, Stockholm.

THE general interest attached to the ritual method of slaughtering cattle employed by the Jews (Schechita)—an account of its supposed cruelty—has led to lively discussions, where, on the one side physiological points of view were emphasised, and, on the other, laymen's supersensitive sympathy for animals became apparent. As, of course, the subjective reaction to pain on the part of animals has hitherto been and, probably, always will, remain hidden from our judgment, we have been obliged, in the discussions respecting various methods of

*Abstract from 3 Nordiske, Veterinaermote, Oslo, 11 Juli, 1928.

slaughtering cattle—as far as the question of protecting the animals from unnecessary cruelty was concerned—to investigate the testimony borne by our observation of certain physiological phenomena, the blood-pressure, the movements of the animals, etc. By these means, and by comparison with corresponding conditions in the case of human beings, endeavours have been made to draw deductions respecting the presence or absence of consciousness, i.e. the condition of conscious sensation of pain in the animals slaughtered. To be able to contribute to such objectively determinable facts as might serve as guides to our judgment in such cases, the writer has carried out certain experiments on cows in connection with the Jewish methods of slaughtering. These experiments form a part of the investigation made by the professors of the Veterinary Institute in Stockholm, as the result of a proposal for a Slaughtering Bill which was placed before the Swedish Parliament in 1925.

1. By measuring the area of the vessels which convey blood to the brain, it has been found that the amount of blood, which is normally carried to the brain by the vertebral arteries, amounts to from $1/5$ to $1/6$ of the total blood supply to that organ.

2. By experiments with a "Stromuhr" placed in one of the vertebral arteries, it has been found that the amount of blood passing through these arteries during the course of the first 20 seconds after the "schechita" cut has been made, falls to about $\frac{1}{6}$ of the amount which passed before, so that the total supply of blood to the brain should, in the same time, fall to $1/30$ - $1/40$ of the normal amount.

3. By collecting and measuring the blood which escaped from the large vessels of the neck after the cut, at periods of half or one minute in duration, it has been found that the bleeding, under normal circumstances, is so rapid that, after half minute, 33 per cent.; after one minute, 50 per cent.; after $1\frac{1}{2}$ minutes, 63 per cent.; after two minutes, 70 per cent.; after three minutes, 83 per cent.; after four minutes, 90 per cent., and, after five minutes, 95 per cent. of the total amount of the blood which runs away, has been carried off.

4. A blood-pressure experiment, carried out with the venous blood in the sagittal sinus of a cow after the cut, gave a slow lowering down to 0, which lasted about $6\frac{1}{2}$ minutes. The seeming want of agreement between this experiment on one side, and on the other side the writer's bleeding experiments and test respecting the speed of the blood-current in the vertebral arteries, and some experiments respecting the arterial blood-pressure and the intracranial pressure,

carried out by Lieben, may probably be explained as resulting from local vasomotor effects.

On comparing the results obtained by the writer's own tests and by Lieben's, the writer has arrived at the conclusion that, in normal procedure, the Jewish method of slaughtering is probably rapidly followed by loss of consciousness, and that, consequently, this method cannot be said to be attended by "cruelty" to the cattle. But, in consequence of the disposition of cows' blood to coagulate rapidly, there *can* ensue, after the cut (and that rather quickly), a closing of the large blood vessels of the neck; so that one ought to take into account the possibility that, during the first few minutes after the cut, the blood pressure may be maintained at such a level that the brain will still receive the amount of blood necessary for consciousness. If in a possible future Slaughtering Bill an exception be made in favour of the Jewish method, excusing those employing it from rendering cattle unconscious by means of shooting or striking the forehead before bleeding, then the writer considers it best, as a protective measure against needless suffering on the part of the cattle, that the regulation should be added to the Act that this latter operation must be carried out immediately *after* cutting, as a guarantee that the slaughtered cattle have, after all, been killed as painlessly as possible.

A FEW NOTES ON AN OUTBREAK OF ULCERATIVE CELLULITIS.

By T. A. COCKSEDGE, M.R.C.V.S.,

Chief Veterinary Officer, British Somaliland.

DURING this year the animals of the Stud Farm were unfortunately visited with a very bad outbreak of ulcerative cellulitis. The disease first occurred in the month of April, and it was December before I was able to declare the outbreak over. During the same time it was reported to me that many native-owned animals in the western area and in Abyssinia were suffering from the same disease, called by the native "bissa." Immediately the first cases were seen they were of course isolated, swabs taken and on microscopical examination the bacillus Priesz-Nocard was demonstrated, also a gram-negative bacillus. On culture and plating out distinct colonies were isolated of these two organisms. The clinical aspect of the disease was very serious, as it seemed to be a very virulent type, and formation of metastatic abscesses was very frequent, death being caused in two cases from

abscesses in the lungs, and a third case forming a large abscess in the perineal region with a rectal fistula.

Treatment in most cases was very unsatisfactory and the percentage of mortality was very high. The only treatment found to be of any value was, in the first instance to open up and thoroughly scarify the ulcers and apply saline dressings, at the same time giving tonics and alteratives. A few cases yielded to this treatment. Towards the end of the outbreak I decided that any but the saline swab treatment was of very little value and as the saline-swabs meant a lot of individual attention—staff for which I had not got—I decided to try mass treatment. Not being far from the sea I arranged for the remaining animals to be immersed daily for two hours in the sea, and the rest of the twenty-four hours to be kept in swabs and bandages soaked in sea-water. The results were very satisfactory as all the cases immediately began to improve and only one case broke down again after apparent recovery, finally even this case made a complete recovery. I am quite aware that this is just a hit in the dark combined with empirical treatment, without any relation to the cause of the disease, but the next time I have the disease to deal with to the sea I am going. The method of spread and the initial infection in this outbreak was undoubtedly due to ticks, a grazing area the animals were taken to was very badly infested with ticks and though the ponies were de-ticked very thoroughly undoubtedly the small sores caused around the fetlocks and heels became infected.

AN EXAMINATION OF A NUMBER OF CASES OF OVINE MASTITIS.

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(Concluded.)

Discussion.

The examination of a number of cases of mastitis in ewes shows that the condition is associated with abundant growth of bacteria within the udder tissue. The changes produced appear to be consistent with the effects of such bacterial activity. Experimentally it has been found possible to reproduce the condition in normal lactating ewes by the injection into the teat canal of pure cultures of the organisms most frequently concerned, and it is therefore evident that such bacteria are capable of setting up mastitis when they obtain access to the udder in sufficient numbers. It must be assumed that under normal conditions

the defensive powers of the udder are sufficient to protect it against harmful effects of bacteria. Organisms are frequently present in the milk sinus and teat canal, but their multiplication is distinctly limited in the healthy gland. The factors predisposing to attacks of mastitis are still largely unknown, and it is also a matter of doubt whether the disease when it occurs is the result of a sudden multiplication of organisms normally present in the milk sinus or teat canal or is due to the introduction of other organisms. Possibly it may result in either of these ways. It has been suggested that wounds and abrasions of the teats may serve as the starting point of infection. These were present in some of the cases we have examined, but the majority of affected animals showed no macroscopic evidence of teat injury.

Many shepherds are agreed that sudden climatic changes, especially a cold easterly wind following a spell of warm weather, increase the incidence of the disease. Cases of mastitis are also not infrequent after weaning unless the ewes' udders are partially stripped once or twice within the first few days.

Summary.

1. Thirty-eight cases of mastitis in ewes have been investigated.
2. Various organisms appear to be associated with this condition.
3. A staphylococcus was by far the commonest organism found in these cases, being present in approximately 66% of those from which growth was obtained.
4. A description is given of the lesions present in natural cases and of the chief characters of the principal organisms concerned.
5. Experimentally it has been found possible to reproduce the condition in lactating ewes by injecting into the udder, by way of the teat canal, cultures of either staphylococci, streptococci or coliform bacilli isolated from natural cases.

Appendix.

DETAILS OF CASES.

Case No. 1. 11.5.25.—This animal was first seen by us when she had been ill for a few hours only. She appeared dull, with drooping ears, and was slightly lame in one hind limb. The visible mucous membranes were injected. Temperature 104.5°. The left half of the udder was considerably enlarged, hot, tense and painful. The subcutaneous tissues in the neighbourhood of the gland showed a diffuse cedematous swelling. The secretion of the affected half consisted of a thin yellowish fluid. Examination of centrifuged deposit showed the presence of a variety

of organisms—gram negative bacilli, streptococci and staphylococci. Cultures of these organisms were readily obtained on artificial media. The staphylococcus was of the albus variety. Blood cultures in which 10 c.c. of blood taken from the jugular vein was used as the inoculum showed no evidence of growth. Part of the affected half of the udder subsequently became gangrenous, and after a period of about five weeks, during which the ewe showed very marked loss of condition, it finally sloughed, leaving an extensive wound which slowly healed. As a result, the affected part became completely atrophied. The animal's blood was tested on 2.6.25 and again on 16.6.25 for the presence of agglutinins for the organisms isolated from the udder secretion. The result was negative.

The other half of the udder remained perfectly healthy, and the ewe recovered completely and reared a lamb the following season.

Case No. 2. 18.5.25.—First noticed to be ill on 16.5.25. When examined she appeared dull but was feeding a little. The left half of the udder was enlarged, hot, painful and slightly hardened. The secretion was a watery yellowish fluid containing whitish floccules.

A gram negative bacillus was obtained in pure culture. The animal recovered.

Case No. 3.—This animal was examined a few hours after she was first noticed to be ill. She was lying away from the remainder of the flock, and had a dejected appearance. Temperature 106° F. The left side of the udder was slightly swollen and tender. The secretion had the appearance of normal milk, but when centrifuged, showed excessive deposit which was rich in leucocytes, and contained numerous cocci. A pure culture of staphylococcus albus was obtained. She died on the fourth day.

Case No. 4.—In the early stages of the illness, the ewe appeared dull, but did not entirely lose her appetite. The affected half of the udder was painful, and the secretion was a yellowish watery fluid containing whitish flocculi. Smear preparations showed the presence of numerous gram negative motile bacilli of which a pure culture was obtained. A fortnight later the general condition of the animal was found to be much improved. The udder showed an indurated area about the size of a large apple. There was abundant secretion of yellowish watery fluid containing fine flocculi. Cultures were made from centrifuged deposit, but no growth occurred. The supernatant fluid showed a very slight agglutinating power for a suspension of the bacilli which were originally isolated from the udder. The blood serum was even less active in this respect. The ewe survived the attack.

Case No. 5.—This animal was examined within a few hours of the onset of illness. There was marked dullness, and injection of the mucous

membranes. The right side of the udder was hot and swollen. The secretion was watery, and of a slightly yellowish tint. There were sores on both teats. Cultures from the secretion yielded a pure growth of *staphylococcus albus*. The ewe died three days later.

Case No. 6.—The ewe had been ill for seven days. The shepherd's description of the udder in the early stages was that it "went hard." The affected side showed marked induration, and the secretion was yellowish and watery, but did not contain flocculi. There was soreness of both teats. Cultures gave a pure growth of a streptococcus. The ewe died.

Case No. 7.—This animal had also been ill for seven days. The diseased half of the udder was indurated and secreted a foul-smelling yellowish brown fluid. Both teats were sore. Cultures gave a growth of a *cocco-bacillus* and *staphylococcus albus*. Recovery occurred slowly with induration and atrophy of the affected side.

Case No. 8.—This was a case of an animal which had recovered from a severe attack of the disease in one half of the udder during the previous season, and had now contracted the affection in the other half. The side originally attacked was atrophied and functionless. The other side was greatly enlarged, and very painful, and the teat was swollen and turgid. There was very marked swelling of the subcutaneous tissues anterior to the gland. The udder secretion which was of a port-wine colour and contained numerous flocculi, was quite free from any offensive odour. In smears made from centrifuged deposit a few leucocytes containing phagocyted cocci were seen. Many free cocci were also present. Cultures gave an abundant growth of *staphylococcus albus*, together with a few colonies of streptococcus. The ewe died after an illness of seven days.

Case No. 9.—The attack developed a month after lambing. When examined, the animal was acutely ill, with very depressed appearance and injected membranes. The right half of the udder was cold and doughy to the touch and showed blackening of the skin around the teat base. The secretion was a pinkish coloured fluid containing whitish flocculi. It was not offensive to the smell. Cultures showed a rich growth of staphylococci. A few colonies of streptococci were also present. The ewe died twelve hours later.

Case No. 10.—The shepherd noticed marked swelling of the udder of this animal about four weeks after lambing. This appeared to subside in a day or two and no other symptoms were observed until a week later, when an acute attack of mastitis set in. The appetite was completely lost, breathing was laboured, and rapid, and the temperature rose to 106.8° F. The left side of the udder was hot, tender and somewhat hardened, and yielded a secretion of the colour and consistence of

thin custard. From the right half a small quantity of apparently normal milk was obtained. A pure culture of staphylococcus albus was obtained from the secretion of the affected half. A week later the general appearance had improved, but the udder was still tense and painful. Subsequently an abscess developed in the lower part of the gland and ruptured externally. It was still discharging two months later, but the condition of the animal was by then much improved. Tests were made to determine whether the blood serum and the whey obtained from the milk of the healthy side of the udder contained agglutinins for the staphylococcus responsible for the mastitis, but the results were negative. The ewe was afterwards "fattened off."

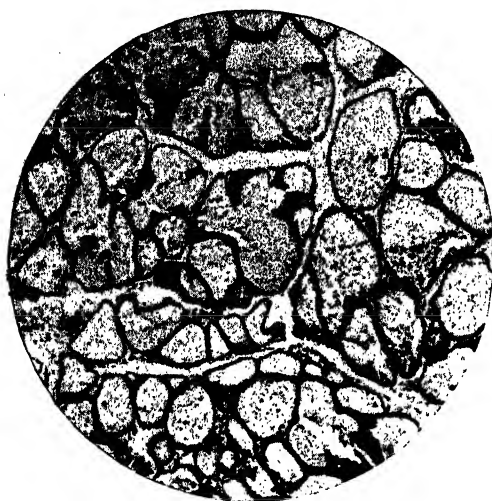


FIG. 1.—Udder. Normal Ewe. Magnification 70 \times .

Case No. 11.—Mastitis developed five weeks after lambing. The temperature quickly rose to 105.5° F. The left half of the udder was hot, painful and slightly hardened anteriorly. Its secretion was of a dark port-wine colour, but was not offensive in odour. Smears showed the presence of cocci and epithelial debris. Cultures yielded a pure growth of staphylococcus albus. The animal died after a fortnight's illness.

Case No. 12.—When examined seven hours after signs of illness were first noticed, the left side of the udder was hot and tense. Palpation revealed the presence of a circumscribed indurated area of the size of a tangerine. The secretion was blood tinged and contained a few strands of solid matter. Numerous cocci were present in smears. Cultures gave a growth of staphylococcus albus. A similar organism was isolated from a sample of blood taken from the jugular vein. The action of these two organisms on carbohydrates proved to be identical. The ewe died five days later and a *post-mortem* examination was made five hours after death. By this time decomposition of the carcass had already commenced. There was little or no œdema or extravasation of the subcutaneous tissue except that of the affected half of the udder. The consistence of the diseased gland was increased. The cut surface revealed marked congestion and showed small areas of softening, but

no large accumulation of pus. The mucous membrane of the galactophorous sinus was markedly injected. The other half of the udder appeared quite normal. The liver was extremely friable, the gall bladder greatly distended, and the contiguous liver surface brownish-black in colour. The cortices of both kidneys were reduced to a pulpy, almost semi-fluid mass. The lungs were congested and œdematous with areas of consolidation. *Staphylococcus albus* was isolated from the udder tissue, but not from the heart's blood or other organs of the body, although a variety of organisms were present in these situations probably as a result of *post-mortem* invasion. Sections of udder tissue showed acute congestion of the vessels and marked thickening of the



FIG. 2.—Mastitis. Natural infection with staphylococci. Organisms present in dark masses. Necrosis and desquamation of epithelium, leucocytic migration and commencing abscess formation. Congestion of blood vessels and widening of interlobular septa. Magnification 70 \times .

interlobular septa due to the presence of a fibrinous exudate. Many of the acini were filled with catarrhal cells, their walls being almost completely denuded of epithelium. In others proliferation of the living cells was in evidence together with multiplication of fibroblasts of the adjacent connective tissue. The consolidated areas of the lung showed a croupous pneumonia.

In the cortex of the kidney the cells of the glomeruli and convoluted tubules had completely lost their affinity for nuclear stains.

Case No. 13.—This ewe died after an illness lasting approximately thirty-six hours. A *post-mortem* examination was made immediately. Secretion obtained from the affected side was watery and of a bright red colour. On section the consistence of the diseased half was less firm than that of the normal. The cut surface was of a slaty-grey colour except for an area immediately posterior to the teat base where it was of a brownish yellow tint. It showed a number of purulent foci. The liver, kidneys and other organs of the body appeared normal. Cultures were made from the galactophorous sinus on each side, the material being obtained by inserting a sterilised pipette through the skin after searing the surface. From the affected side a streptococcus was isolated, but no growth was obtained from the other half. The

heart's blood also yielded a culture of a streptococcus which differed from the udder strain in its action on carbohydrates.

Histologically, numerous small abscesses were present in the affected tissue. There was marked congestion of the vessels throughout and in the part already described as having a brownish tint, many extravasated red cells were present. The interlobular septa were thickened due to infiltration of exudate and fibrin deposition. Leucocytes were abundantly present. The acini showed well-marked proliferation and desquamation of their lining cells as a result of which many of them were filled with masses composed of shed epithelium, leucocytes and clumps of cocci.

Case No. 14.—Material for examination was obtained from this



FIG. 3.—Mastitis. Natural infection with staphylococci. Organisms present in dark masses. Necrosis and desquamation of epithelium, leucocytic migration and commencing abscess formation. Congestion of blood vessels and widening of interlobular septa. Magnification 200 \times .

animal within a few hours of symptoms of mastitis being evident. The temperature was 103.8° F. The right side of the udder was affected. On palpation an area around the base of the teat was tense and painful. As the lambs had recently suckled, only a small quantity of secretion was obtainable. This had the appearance of a thin blood-stained fluid. Cultures gave a pure growth of staphylococcus albus. The animal died three days later.

Case No. 15.—At the time this ewe was examined, the shepherd stated that she had shown signs of illness for not more than four hours. She was very dull in appearance, and was standing with the ears drooping and the back arched. Temperature was 105.4° F. The right side of the udder was rather more bulky and firmer to the touch than normal. The secretion was fairly copious and not much changed in appearance except that it contained a few flocculi. When centrifuged it gave an excessive amount of deposit in which numerous leucocytes were present. Cultures yielded a pure growth of staphylococcus albus. A week later, the ewe showed marked wasting, and the temperature was 103.8° F. There was no sign of abscess formation in the udder. The secretion was a thick glutinous yellow fluid. In addition to

staphylococci various other organisms were present. The animal died a few days later.

Case No. 16.—The ewe was very dull in appearance, and showed marked disinclination to move. She had been ill for two days. The left side of the udder was somewhat enlarged and was hot, tense, and painful on palpation. The secretion was a straw-coloured fluid containing flocculi. The animal was destroyed and examined *post-mortem*. To the naked eye the appearance of the udder tissue was almost identical to that described in Case No. 12. The liver showed slight fatty changes. The capsules of the kidneys were adherent in parts and the cortical substance was a little less firm than normal. Other organs appeared healthy. Cultures were made from the udder, kidney, liver and heart's blood. From the two last named organs no growth was obtained, whereas both the udder and kidney gave a growth of staphylococcus albus. The organisms from these two sites were similar in their action on carbohydrates.

Histological examination of the affected udder tissue showed very acute congestion of the blood vessels, and the presence of multiple



FIG. 4.—Mastitis. Experimental infection with staphylococci. Magnification 70 \times .

small abscesses varying in size up to 1 m.m. in diameter. Elsewhere many of the acini were filled with cellular exudate mainly composed of catarrhal cells and polyneuclear leucocytes. Clumps of cocci were abundantly present in this material. In other acini the changes were less marked though in most of them some degree of proliferation and desquamation of the epithelial cells was apparent. The interlobular

septa were distended as a result of the presence of fibrinous exudate. The kidney showed a glomerulo-nephritis.

Case No. 17.—On the first day of illness the appetite was almost completely lost, the animal appeared very depressed and her temperature was 106° F. The left side of the udder was hot, painful and firm to the touch. The secretion was pale yellow in colour and contained numerous large whitish flocculi. It gave a growth of a gram negative bacillus.

The milk of the other half of the udder was sterile. The animal recovered.

Case No. 18.—An examination was made five days after the commencement of the attack, by which time some improvement in the animal's condition had taken place. The temperature was 103.8° F. The left side of the udder was firm and rather cold to the touch, and yielded a thin blood-stained secretion. In cultures the predominating organism was staphylococcus albus. Streptococci and coliform bacilli were also present. Blood drawn from the jugular vein gave a culture of staphylococcus albus. The animal recovered.

Case No. 19.—This was a very acute case with a sudden onset and



FIG. 5.—Mastitis. Natural infection with streptococci. Organisms present in small dark masses. Well-marked congestion of blood vessels. Necrosis and desquamation of epithelium. Part of an abscess is seen on the edge of the figure. Magnification 70 ×.

rapidly fatal termination. The temperature at the sixth hour was 105.2° F. The animal was extremely dull in appearance and showed a marked disinclination to remain standing. On palpation the left side of the udder was cold and "doughy." The secretion yielded a pure culture of staphylococcus albus. Death occurred after eighteen hours.

Case No. 20.—The attack had been in progress for three days

The animal was frothing at the mouth and grinding her teeth. The right half of the udder was enlarged, dark red in colour, and cold to the touch, especially around the base of the teat. Permission was obtained to destroy the animal for *post-mortem* examination. The carcass appeared to be well nourished. The subcutaneous tissue anterior to the udder was saturated with sero-sanguineous fluid. The udder tissue on section was less firm in consistence than normal and slate grey in colour except for the lower third which was brownish red. Several purulent foci were present in it. A watery port wine coloured exudate flowed from the cut surface. The other organs appeared normal. Staphylococcus albus was isolated from the udder tissue and the galactophorus sinus. From the heart blood and other organs of the body no growth was obtained. The histology of the udder tissue has already been described in the text. Sections of the subcutaneous

tissue in the neighbourhood of the gland showed acute congestion of the blood vessels with extravasation of red cells, aggregations of leucocytes surrounding clumps of cocci and proliferation of fibroblasts.

Case No. 21.—A ewe killed for experimental purposes apart from this investigation, showed evidence of mastitis affecting the right half of the udder. This was enlarged and yielded a copious secretion (about a litre) of a light yellow coloured fluid rich in flocculi. To the naked



FIG. 6.—Mastitis. Natural infection with *pasteurella* organism. Catarrhal changes well-marked. Some of the acini contain a fibrinous exudate. Magnification 70 \times .

eye there was not much difference in the appearance of the udder tissue of the diseased and healthy sides. Cultures gave a growth of a gram negative bacillus from the right half, but no growth from the left. The histological changes were those of a very early stage of mastitis. There was slight congestion of the blood vessels and moderate leucocytic infiltration. Some of the acini contained a few catarrhal cells.

Case No. 22.—A ewe belonging to the flock of the Department of Animal Pathology showed slight enlargement and induration of the left side of the udder. The secretion which was thick and creamy, yielded a culture of a motile gram negative bacillus. The affected part gradually became atrophied.

Case No. 23.—This animal, which was killed for experimental purposes apart from this investigation, showed an appreciable enlargement of one half of the udder. Otherwise the gland appeared to be quite normal to the naked eye. Cultures from the swollen side gave a growth of *staphylococcus albus*. Those from the other side were negative. Histological examination showed early catarrhal changes of the affected part.

Case No. 24.—This ewe was examined six hours after signs of illness were first noticed. The right side of the udder was affected and showed the usual symptoms. The milk was unchanged in colour, but contained a few small flocculi. On centrifuging, a large amount of deposit very rich in cocci was obtained. Cultures gave an abundant growth of *staphylococcus albus*. The ewe died three days later, and when

examined *post-mortem* her udder showed the typical appearance of "black garget." The histological changes were similar to those noted in other cases of staphylococcal infection (see text).

Case No. 25.—In the early stages of the disease the right side of the udder was found to be swollen and painful, darkish brown in colour, and somewhat cold in the lower third. There was ulceration of both teats accompanied by scab formation. The temperature was 104.8° F. Secretion from the affected part was abundant. It was a light brown watery fluid, acid in reaction and containing flocculi. The secretion contained such large numbers of organisms that it was impossible to count the colonies developing on agar plates inoculated with .002 c.c. The growth consisted of a mixture of streptococci and staphylococci. The ewe died three weeks later as a result of the onset of gangrene. At the time of death partial sloughing of the dead tissue had occurred.



FIG. 7.—Mastitis. Experimental infection with coliform organism. General proliferation and desquamation of epithelial cells. Evidence of commencing fibroblastic multiplication. Magnification 70 \times .

Streptococci were also present. Several doses of autogenous vaccine were given, but the ewe died a fortnight later.

Case No. 27.—A ewe belonging to the flock of the Department of Animal Pathology was killed for experimental purposes. The history of the animal which was suckling twin lambs showed that on the previous day the secretion from the left teat was seen to be blood stained, and four days earlier that from the right teat had appeared thick and purulent. On section the right half of the udder was a little firmer in consistence than normal. The galactophorous sinus contained a quantity of thick creamy material. The contents of the sinus of the left side appeared to be normal. The udder tissue itself showed no

Case No. 26.—At the time the examination was made the animal had been ill for eight hours. She showed great prostration and had a temperature of 104° F. The left side of the udder was enlarged and firm to the touch, but did not seem very hot or painful. The secretion was yellowish and watery. Smears showed the presence of cocci. In cultures the growth was mainly that of staphylococcus albus.

appreciable alteration. No organisms could be detected in smears made from the contents of the two sinuses, but in cultures a sparse growth of staphylococcus albus was obtained from each.

Histologically, the udder tissue showed no abnormality.

Case No. 28.—This ewe died of mastitis after an illness of three days. On *post-mortem* examination the changes in the udder tissue were confined to the right half of the gland. The overlying skin was discoloured, and on section a blood-stained serous fluid exuded from the cut surface. The gland tissue showed very distinct lobulation and varied in colour from reddish to grey. In the galactophorous sinus there was a quantity of yellowish fluid containing many flocculi. A number of cultures were made, all of which yielded a pure growth of a gram negative bacillus that showed a tendency to stain deeply at the poles. Histologically, the udder showed marked distension of the blood vessels, and widening of the interlobular septa as a result of the presence of fibrin deposit. The alveoli showed acute catarrhal changes, but little or no evidence of necrosis. The causal organisms were scattered throughout the affected tissue in some parts of which they were present in large clumps.

Case No. 29.—A sample of milk was received from a case of mastitis of twelve hours standing which occurred in the same flock as Case 28. The milk was watery and contained a few floccules. Smears showed the presence of a gram negative bipolar organism similar in appearance to that obtained from the previous case. The ewe died two days later, and her udder was removed and forwarded to the laboratory. The left side only was affected. On section, it was firmer in consistence than normal. The cut surface was greyish brown in colour, and beset with small hæmorrhages. A pure growth of the bipolar organism was recovered in cultures. The histological changes in the udder tissue were similar to those described in the previous case, except that the catarrhal changes were even more advanced.

Case No. 30.—A further case in the same flock. A sample of milk was taken and forwarded to the laboratory within a few hours of the commencement of illness. It was a yellowish watery fluid containing numerous flocculi. Cultures yielded a pure growth of a bipolar organism. The animal recovered.

Case No. 31.—This case occurred in Northumberland. A sample of udder secretion was taken and examined on the third day of illness. The material was straw-coloured and watery. Large numbers of cocci were present in it. Cultures gave a pure growth of staphylococcus albus. The animal died a week later, but it was not possible to make a *post-mortem* examination.

Case No. 32.—A sample of udder secretion was received from a case

of mastitis of more than three weeks standing. The material was very thick, slate grey in colour, and had an offensive smell. Smears showed the presence of large numbers of diphtheroid organisms together with a few cocci. A mixed culture of diphtheroid and staphylococcus albus was obtained. It was later reported that the ewe had recovered.

Case No. 33.—This was a case of mastitis involving both sides of the udder. The second half showed inflammatory symptoms about twenty hours after the first. The udder was cold to the touch and had a livid appearance. It showed a number of yellowish patches which looked like areas of necrosis. No secretion could be obtained from the right teat, but from the left a thin hæmorrhagic fluid was withdrawn. Smears from this showed the presence of groups of cocci. A pure culture of staphylococcus albus was obtained. A sample of blood removed from the jugular vein proved to be sterile. The animal recovered from the attack.

Case No. 34.—This animal had been affected with mastitis in one half of the udder for about a month. The remaining half appeared healthy. From the affected part a thick creamy secretion was obtained. It was greenish yellow in colour and had an offensive smell. A cultural examination resulted in the isolation of a diphtheroid bacillus, together with staphylococcus albus, the former being the more abundant. The animal survived the attack.

Case No. 35.—This was an old standing case of seven weeks duration affecting the right side of the udder. The secretion took the form of a light brown watery fluid containing whitish flocculi. A diphtheroid bacillus was recovered in pure culture. The animal recovered.

Case No. 36.—This was another old standing case of about the same duration as the previous one. Sores were present on both teats. The appearance of the milk at this stage was practically normal. A number of cultures were made but no growth resulted.

Case No. 37.—The animal had been ill for about six hours. The left side of the udder was hot, tense and painful. A healing sore was present at the base of the teat. The secretion was a serous hæmorrhagic odourless fluid. The animal was destroyed on the following day when *in extremis*. *Post-mortem* examination revealed the presence of a serous infiltration of the subcutaneous tissue adjoining the anterior part of the gland. The udder tissue, on section, had the typical appearance of a case of "black garget." There were no marked changes in any of the other organs. Cultures from the udder and heart's blood yielded a pure growth of staphylococcus albus. The histological changes seen in the udder tissue have already been described in the text.

Case No. 38.—On examining this animal a few hours after the onset of mastitis the left side of the udder was found to be hot, painful and

slightly hardened. A thin whitish secretion containing strands of fibrinous material was withdrawn from the teat. The animal's temperature was 105.2° F. A pure culture of a bipolar organism was obtained from the secretion. This was the third case of mastitis to occur in this flock during the 1928 season and it proved fatal a few days later. The other two cases, which we had no opportunity to examine, were stated to have recovered. The bipolar organism was similar to that isolated from three cases in the same flock during the previous season.

REFERENCES.

- (1) d'Arboval. Dictionnaire; Édition de 1823, T. 3, p. 94 (quoted from Nocard, *vide infra*).
- (2) Kotelmann. "Ueber eine häufig schnell in Brand übergehende Entzündung am Eutersaugender Mutterschaafe." *Zeitschr. für die ges. Thierheilk.*, 1836, p. 423.
- (3) Lafosse. "Mammite chez les Brebis." *Journ. des Vet. du Midi*, 1856, p. 486.
- (4) Rivolta. "Mastoite Septica nella Pecora." *Giorn. di Anat. Fisiol e Patol.*, 1875, p. 139.
- (5) Nocard. "Note sur la Mammite Gangreneuse des Brebis Laitieres." *Annales de L'Institut Pasteur*, 1887, Sept., p. 417.
- (6) Mathis. "Mammite Gangreneuse chez une Chevre." *Journ. Med. Vet.*, 1895, p. 82.
- (7) Esser. "Seucheuartiges Auftreten der brandigen Eutereutzündung bei Schafen." *Archiv. für Thierheilk.*, 1889, B.15, p. 133.
- (8) Bridré. *Bull. Soc. Cent. Med. Vet.*, 1907, p. 500-505.
- (9) Pfeiler. *Zeitschr. f. Infect. der Haut*, 1908, B. IV, March 26.
- (10) Gilruth. *Vety. Jour.*, 1910, New Series, Vol. 17, p. 649.
- (11) Eliore. *Rec. Med. Vet.*, 1922, June 15, pp. 325-335.
- (12) Jones. *Jour. Exp. Med.*, 1918, No. 28, p. 724.
- (13) D'Heil. *Zeit. f. Fleisch und Milchhyg.*, 1905, Dec., p. 84.
- (14) Evans. *Jour. Inf. Dis.*, 1916, Vol. 18, p. 437.
- (15) Heinemann. "Milk." Saunders & Co., 1919, p. 268.

Correction: Table II should read:

C 1925 Number of Cases 2 Staphylococci 1 Coliform 1

Translations

Contribution to the Study of the Etiology of Milk Fever.

By Dr. E. AME,

Veterinary Surgeon at Obernai.

Revue Générale de Méd. Vétérinaire, Feb. 15, 1929.

WE think it would be useful to cast aside this misleading name, by which we wish to describe an asthenic or comatose state following calving which occurs in dairy cattle. Everybody knows the more or less marked phenomena which characterise puerperal coma. On the other hand the many explanations which the classics as well as the authors of original works have given of this accident show that the

question of its etiology and pathogeny still remain obscure and debatable. We have no pretension to decide the question which remains open ; but we do intend to contribute very modestly to the study of a very interesting question. We wish to advance directly that we are disposed to plead in favour of a plurality of causes of a syndrome which in our opinion may be provoked by pathological states of different nature. The quick occurrence, the disturbing progress (accompanied by fall of temperature), the rapid recovery without convalescence, all denote " a sudden rupture of humoral equilibrium," and calls to mind anaphylactic shock, flocculation (*Lumiere*), such as occurs in auto-sensibilised subjects.

On the other hand one sees the resemblance of the syndrome to insulinemic shock such as one observes in the diabetic man following an exaggerated insulin injection. We have had the idea for several years of treating " milk fever " exactly as one treats, with success, the diabetic affected with an insulinemic shock, that is to say by an intravenous injection of glucose. In a series of cases of calving coma we have injected 100 to 200 grammes of glucose—and, in fact we have been surprised to find in several consecutive cases, a cure as prompt as one has a right to expect from mammary insufflation, with this advantage, that the lacteal secretion suffers no decrease. We explain the phenomenon as follows :—The lacteal secretion, suddenly brought about at the time of parturition, releases a glycogenic discharge of the liver. Then the liver, an antagonistic organ of the pancreas in insulin-glycogenic metabolism, was rested during gestation : held in equilibrium and unstable with the pancreas, this equilibrium is suddenly upset by the glycogenic discharge. It is broken to the profit of the pancreas and to the detriment of the fatigued liver. The result will be an insulinemic shock.

Thus encouraged by magnificent results we believed we held the key of the enigma when one fine day in a typical case the new " miraculous cure " is shown to be without effect and we are obliged to resort to the old classic method of mammary insufflation. Since we have had experience that the glucosed injection is ineffective in scarcely a majority of cases.

For this cause we have given it up about a year.

It still appeared to us to be interesting to see if the preventive treatment by the injection of glucose immediately after parturition, is effective or not. The experience gained causes us to answer in the negative. Recently a cow affected with " milk-fever " last year, and which could only be saved by insufflation, calved again naturally. During several weeks before the term she had received a daily dose of 100 grammes of sugar. A few hours after calving we injected 100

grammes of glucose and 10 grammes of adrenalin. Fourteen hours after the injection she fell into a profound and very grave coma, which necessitated two energetic insufflations (the second six hours after the first) and some hypodermic injections of veratrine and caffeine.

From these facts it appears that there are at least two different determining causes of vitulary coma; in a part of the cases the shock appears to depend on a hypoglycæmia, but in the majority of cases causes of another nature must be impeached.

Abstract

On a Piroplasmosis-like Disease of Cattle in Sapporo and its Neighbourhood.*

By CHIUSI KOHANAWA and KISAJIRO OGURA,

Veterinary Institute, Hokkaido Imperial University, Sapporo.

IN Sapporo and its neighbourhood, especially in the Makomanai Livestock Breeding Farm, there has been a piroplasmosis-like disease of cattle, so-called "tick fever," which chiefly attacks pastured cattle and its damage is not small. As recently its damage has gradually become larger and larger, it is now a matter of importance scientifically and practically to investigate the cause and nature of the disease. We have engaged in the investigation of the disease for several years and have already examined about 90 diseased cattle in order to know the character of the illness. We obtained the following results from blood examination, *post-mortem* results, inoculation experiments and trypanblue (Cassella) injection. But our investigation will continue since it has not come to a satisfactory conclusion.

1.—The so-called "tick fever," which is an epidemic disease among the cattle in Sapporo and its neighbourhood, occurring in summer, is analogous in type to piroplasmosis.

2.—The main symptoms consist of fever, anæmia, icterus, hæmoglobinuria and abnormal erythrocytes pathologically changed; but it is very seldom that a case has all fine symptoms. Even in cases in which both fever and anæmia are very slight and the other symptoms are absent, there are always abnormal erythrocytes in the blood. For this reason we think that the abnormal erythrocytes are the most important factors in the diagnosis of this disease.

* Abstract from *The Journal of the Japanese Society of Veterinary Science*, Vol. IV, No. 3.

3.—It is not possible now to determine to what kind of piroplasmosis this disease belongs ; but it coincides with neither Texas-fever nor coast fever. The disease resembles the former in symptoms, but the piroplasma in the blood of the diseased animals are quite different in form ; and the disease differs from coast fever in symptoms, but the parasitic piroplasma morphologically resembles each other very nearly.

4.—This disease is analogous to piroplasmosis, but the piroplasma proved in the blood cells cannot be decided with certainty as the excitants of the disease. For the presence of piroplasma in the blood does not always denote that the animal is infected. We have often found that healthy cattle have rather more parasites in the blood than the diseased animals. As is proved by the inoculation experiments with the blood of infected cattle into healthy ones, the transmission of piroplasma and invasion of the disease does not go hand in hand.

5.—With respect to the therapeutic value of trypanblue (Cassella), we cannot express an opinion, for we used too few animals for this purpose. But according to our experiments the trypanblue is not good for this disease, being rather harmful to the infected animals.

News

It was agreed that from August 1st assistant veterinary officers of the Surrey County Council be paid at the rate of £400 per annum, rising by annual increments of £20 to £500, the present scale being £350 to £500. It was stated that the former scale did not attract applications.

Royal Veterinary College.

At the annual general meeting held recently, Lt.-Col. Sir Merrik R. Burrell, Bart., C.B.E., Floodgates, West Grinstead, Horsham, Sussex, was elected Chairman of the Board of Governors in succession to the late Lord Northbrook. Viscount Lascelles, Lord Daresbury, Lt.-Col. Sir Merrik R. Burrell, Bart., Sir Walter Gilbey, Bart., and Lt.-Col. Sir Archibald Weigall were elected Vice-Presidents of the College.

Second National Dog Week.

THE Second National Dog Week, organised by the National Dog Week Council, under the presidency of Lord Chesterfield, is to be held from September 22nd to 28th.

Apart from its educational and propagandist aims, the Second National Dog Week has for its object the raising of the final £10,000 for the Royal Veterinary College Canine Diseases Appeal Fund (the rebuilding of the dilapidated Canine Section of the Royal Veterinary College, which will enable them to cope with the immense amount of work done for the suffering animals of the poor, and the endowment of a Chair of Professorship in Canine Medicine and Surgery).

As a result of the last National Dog Week the first £10,000 was raised, and as soon as the minimum of £20,000 has been reached through this year's effort the most needed thing in dogdom to-day will have been put on a working basis—a specialised inquiry into the many obscure dog diseases which are yearly taking an increasing toll of British dogs, and a consequent minimising of canine suffering and mortality.

Our readers can render the National Dog Week Council the greatest possible assistance. They can organise local effort in their own towns, or merely assist in the immense amount of propaganda work required throughout the country. The National Dog Week Council, of 37-8, Temple Chambers, Temple Avenue, London, E.C.4, will be only too pleased to give the fullest possible particulars of what they require their voluntary workers to do. Offers of assistance should be sent to the above address.

The Veterinary Profession in Spain.

THE four Veterinary Schools of Spain are situate in Madrid, Leon, Zaragoza (Saragosa) and Cordoba. Each of these Schools has a teaching staff of 8 Professors and 5 Assistants, the course is a five years' course, and the number of students is approximately 280 in Madrid, 230 in Leon, 250 in Zaragoza, and 190 in Cordoba.

There are 5,000 Veterinary Surgeons in Spain; 90 of these are Public Health Inspectors, whose salaries are paid by the State; 350 are Veterinary Surgeons in the Army; the rest are called "Veterinarios Municipales" and work in the towns and villages.

Personal

COLONEL GLASSE has resigned the post of States' Veterinary Officer to the Government of Guernsey and Major P. D. Carey has been appointed in his stead.

DR. THOMAS W. M. CAMERON, B.Sc., Ph.D., M.R.C.V.S., Lecturer in the London School of Hygiene and Tropical Medicine, has been appointed Lecturer in Helminthology in the Department of Zoology of the University of Edinburgh and the Royal (Dick) Veterinary College.

COLONEL W. S. ANTHONY, C.M.G., has been selected for the appointment of Director-General, Army Veterinary Services, with the rank of Major-General, to date from December 1, 1929, in succession to Major-General H. T. Sawyer, C.B., D.S.O.

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SEPTEMBER, 1929.

Editorial

THE PRESENT POSITION OF THE PROFESSION.

THAT the profession is still very much alive, notwithstanding the comparative disappearance of the horse off the streets was well illustrated at the recent Congress of the National at Ayr, where the Scottish Section gave a great welcome to their fellow members ; the result being one of the most enthusiastic and best attended meetings which has ever been held. The discussions were well sustained, the surgical demonstrations well attended, and everybody seemed satisfied. In Scotland, as in England, there appeared a difficulty in obtaining a sufficiency of assistants to supply the needs of the practitioner ; and even in instances where the salary offered was good, the shortage of suitable candidates was manifest. This is undoubtedly to some extent accounted for by the openings which have been made for our younger graduates by the Public Health authorities, and it is to these younger men that a word of caution is necessary in that they must consider well the terms and prospects, and especially the limitations and slow rises of salary generally offered, before acceptance ; as once in

the groove of municipal or government service it is difficult to re-enter private practice, and in many instances the rise of salary is very slow—unjustifiably so—and much slower than an ambitious man can make by his own exertions in private practice.

The opportunities which lie before the young graduate of to-day are infinitely greater than they were thirty years ago, whilst they are increasing both in number and value, it remains for the Council, who are the advisers of the profession, as well as the individual members themselves to see that we let no opportunity slip to press our claims.

State Veterinary Medicine is at last coming into its own ; and Veterinary Research too, as evidenced by the recent establishment by the Empire Marketing Board, of three Fellowships at Onderstepoort Laboratory, at £1,000 a year each, is at last receiving tardy, but fair, recognition. Let us hope that each of these Fellowship posts will be gained by a Veterinarian. There never was a time in the history of the profession when the opportunity to make itself felt, was greater, for the positions to be filled in all branches far exceed the supply ; and the suitable graduate of the present day is able to make a selection which his forbears never dreamt of ; a selection not only of positions to fill, but of post-graduate study which is only at present on the threshold, in England, of what it will become within the next decade.

General Articles

THE EXPERIMENTAL VERIFICATION OF THE QUESTION AS TO THE PURPOSE OF THE FILIFORM PROCESS ON THE RAM'S PENIS; AND THE POSSIBILITY OF PRODUCING STERILITY BY AMPUTATION.

By PROFESSOR E. J. JWANOW,

Department of Biology of Reproduction State Institute for Experimental Veterinary Medicine, Moscow, Russia.

IN the classic manual of "Physiology of Reproduction" by F. Marshall (page 260-261) (1) we read :

"The fact that the filiform prolongation is an erectile organ points to the conclusion that its function is insertion into the os uteri during copulation. An examination of the uterus in the sheep shows that the os, when open, is fully large enough to admit of the entrance of the distal portion of the penis in the region of the glans. If the extreme distal end does so enter, the filiform process must extend into the cavity as far, or nearly as far, as the junction of the relatively short corpus uteri with the two cornua. That the appendage functions in the manner described seems additionally probable in view of the fact, to which sheep-breeders attest, that if the process is cut off the ram is rendered barren. Professor Robert Wallace informs me that it used to be a regular practice, for the protection of ewes while being driven south from the Highlands of Scotland, to cut off the filiform appendage from the rams to prevent them from impregnating the ewes on the way, this method of inducing sterility proving quite as effective as removal of the testicles."

Let us quote one more extract from the later work of F. Marshall and J. Hammond (page 16-17) (2) :

"The semen (as well as the urine) must pass through this tubular prolongation before being discharged, and there can be little doubt that its function is insertion into the os uteri during coitus, for it is believed that if the 'worm' is cut off the ram is rendered barren. Thus, ram traders, when wishing to discard tups for breeding purposes, have been known to remove the appendage before sending the ram to market. Many novices are said to have been deceived by this practice, called 'worming,' for such rams may be bought in open market by unscrupulous dealers, who pass them on as sound sires, though they themselves have only paid a 'butcher's' price for them. It is not certain, however,

that the removal of the appendage always induces sterility, and it may be easily understood that as long as the spermatozoa can be injected into the vagina of the ewe, some at least may effect an entrance into the uterus and so reach the ova. This is probably the explanation of those cases which have been reported where it is said that 'wormed' tups have yet been fertile. It is probable that the precise truth is that whereas the integrity of the filiform appendage is as a general rule essential for fertility, yet exceptional cases have occurred in which 'worming' has not brought about sterility, in just the same kind of way as incomplete coitus in other animals is sometimes followed by pregnancy in the female. Moreover, it is clear that any injury to such a delicate structure as the filiform appendage may impair a tup's fertility, and one such case has come under the writers' observation. It is desirable, therefore, that when a ram is suspected of being infertile an examination of the filiform appendage should be made."

The considerations mentioned by the above-named authors have not yet been experimentally verified. As to the information got from sheep-breeders, it can hardly be considered as indisputable. Besides, the sterility of rams after the amputation of filiform process even if it has taken place, can be explained not by the lesion and removal of an organ important in itself, but by the operation which artificially creates hypospady. The sperm of a ram thus operated (see Fig. No. 1) should not be ejected forwards, but somewhat to one side of and behind the glans penis. Thus, especially when the vagina of a sheep is narrow, and the penis is fairly well developed, a considerable amount of the sperm may be brought out from the vagina together with the penis, as it would with a piston, and this may greatly reduce the possibilities of conception.

In autumn of the year 1928, carrying out a mass experiment of the artificial insemination of sheep in North Caucasus I made some experiments with the purpose of clearing up the question as to how the amputation of processus uretrae affects the fertility of rams, and if it does, what is the resultant sterility of rams determined by. Five rams and 25 ewes of the Voloshsk breed were taken for the experiments. The age of the experimental ewes and rams varied from $2\frac{1}{2}$ - $3\frac{1}{2}$ years. The state of nourishment was the average. The sexual organs were normal. The rams were not coupled in that covering season. The ewes were taken from the experimental band and were not yet inseminated in the given season. As may be seen in the table given (page 353), the experimental rams were allowed to cover 2 females, 3 or 4 days before the operation. On the 26/10 with the observation of the elementary rules of asepsis the filiform process of all 5 rams was cut off with sharp scissors, at the very base.

**The Results of the Experiments before and after the
Amputation of the Filiform Process.**

NN of rams	Before Operation			After Operation done on 26/10/1928		
	NN of covered ewes	Date of covering	Results of covering	NN of covered ewes	Date of covering	Results of covering
6275	2707	22-10	Lost No.	5466	4-11	Brought 1 lamb ♀ on 31/3 29
	5379	23-10	Manifested heat on 7/11 28	2795	4-11	Lost No.
				5788	6-11	Perished on 24/12 with embryo
6280	5121	22-10	Manifested heat on 8/11	3093	4-11	Brought lamb ♂ on 2/4/29
	5079	23-10	Brought lamb ♀ on 20/3	3134	5-11	Brought lamb ♀ on 31/3/29
				5088	6-11	Brought lamb ♂ on 4/4 29
6281	3377	22-10	Brought lamb ♂ on 19/3/29	5047	4-11	Manifested heat on 21/11/28
	2800	23-10	Manifested heat on 8/11/28	3565	5-11	Aborted on 16/2/29
				4870	6-11	Lost No.
6282	2956	22-10	Brought lamb ♀ on 24/3 29	3415	4-11	Brought lamb ♀ on 24/3/29
	3236	23-10	Brought 2 lambs ♀ on 23/3/29	3163	5-11	Brought lamb ♀ on 11/4/29
				5947	6-11	Brought lamb ♀ on 6/4/29
6284	5506	22-10	Manifested heat on 7/11 28	4836	4-11	Brought lamb ♀ on 31/3/29
	3292	23-10	Aborted on 25/2/29	3412	5-11	Aborted on 15/2/29
				5699	6-11	Brought lamb ♂ on 31/3/29

Total :	Positive results	5	Positive results	12
	Negative "	4	Negative "	1
	Unknown	1	Unknown	2
		<hr/> 10		<hr/> 15

The cicatrization of the wound went on very rapidly, and 9 days afterwards the rams showed a strongly expressed desire to cover ewes. Each of them was allowed to cover 3 ewes. Both the first 10 ewes and

the remaining 15 were under close observation all the time. The test of test-rams went on till the end of December and was carried out in the presence and under the control of zootechnists, my collaborators. The result of these experiments, as shown in the table proved to be as follows : 15 or 16 days afterwards 4 of 10 ewes covered by the rams before the latter were operated, manifested heat and remained non-pregnant. Five ewes proved to be pregnant for certain, and one ewe which, after coupling, showed no heat till the end of December, remained unascertained, as it had lost its ring, owing to the severe frosts.

Only one of the 15 ewes covered by the operated rams manifested heat (on the 17th day) ; 12 ewes proved to be unquestionably pregnant, and it was impossible to find out exactly whether conception had taken place in 2 ewes, which had not manifested any heat for 2 months after the coupling, as they had lost their rings owing to the same reason.



Distal end of ram's penis, as seen from the left side, showing glans and filiform appendage. The prepucis is folded back. Slightly reduced.. (From Fr. Marshall.)

The considerable increase of the per cent. of conceptions obtained from the experimental rams after the operation in comparison with the per cent. received from the same rams before the operation is explained, according to our opinion, by the fact that the first 10 ewes were covered by rams which were coupled that season for the first time. The first couplings of the season, according to my observations, later confirmed by others, should give a lower per cent. of conceptions. I pointed out this circumstance at an earlier date (3).

Thus, the principal argument upon which the above mentioned authors base their explanation of the purpose of the processus uretræ, falls away, and along with it the supposition that the sperm in the sheep is not ejaculated into the vagina, but into the uterus, becomes unacceptable.

Conclusions.

I. The amputation of the processus uretræ of a ram does not decrease its fertility, and therefore can by no means replace castration.

II. The former interpretation that the purpose of the processus uretræ is to enter the uterus and introduce the sperm directly into the uterus is not confirmed by experiments.

III. The data obtained by us from experiments with rams deprived of processus uretræ, gives ground to believe, that in the sheep, as well as in the other species of domestic animals, the sperm is ejaculated not into the uterus, but into the vagina.

(1) "The Physiology of Reproduction," by Francis Marshall, 1922.

(2) "The Physiology of Animal Breeding with Special Reference to the Problem of Fertility," F. H. A. Marshall and John Hammond. Research Monograph, 2nd edition, London, 1926.

(3) See "E. Jwanow de la Fécondation Artificielle chez les Mammifères." Arch. des Sciences Biologiques, Vol. xii, 1907.

ANATOMICAL STUDIES, No. 10: OSSIFICATION IN THE LEFT DIAPHRAGMATIC CRUS OF A HORSE.

By W. G. BARNARD,

Faculty of Veterinary Science, Transvaal University College, Pretoria.

THE occurrence of osseous tissue in unusual situations, e.g. fascia, muscle, etc., is not as uncommon in veterinary science as would be imagined by a study of the literature. The object of this note is to record such a case of connective tissue metaplasia. (Joest and Schieback 1924).

While dissecting the trunk of an aged gelding, 18701, killed 13/2/29, the left crus of the diaphragm was observed to contain an ossified

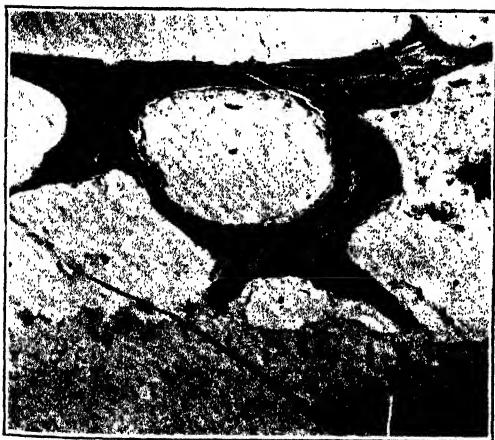


FIG. 1 (X 70). Note cartilage shell and osseous centre; radial arrangement of cartilage cells and basophilic capsules are clear.

structure measuring 4 c.m. x 2 c.m. x 0.5 c.m. On section a central space filled with a red marrow-like material was noted. After appropriate treatment, sections, cut by the freezing method, were stained with Bohmer's hæmatoxylin-eosin and examined as follows:

Low power (see Fig. 1). An elongated shell of hyaline cartilage which generally stained pink was present. Within this and occupying approximately half of the short transverse diameter was osseous tissue represented

by Haversian systems. The cartilage cells around the circumference of the structure were small and parallel to the surface, whereas those around the periphery of the central focus of ossification showed typical proliferative changes, namely, enlargement, basophilic staining of newly formed matrix, and radial arrangement of cells. The older lamellar tissue of the Haversian systems stained violet, but immediately lining the canals was a pink edge representing the newly formed lamellar tissue or physiological osteoid. The bone cells, however, were recognised with difficulty owing to the method of preparing the section.

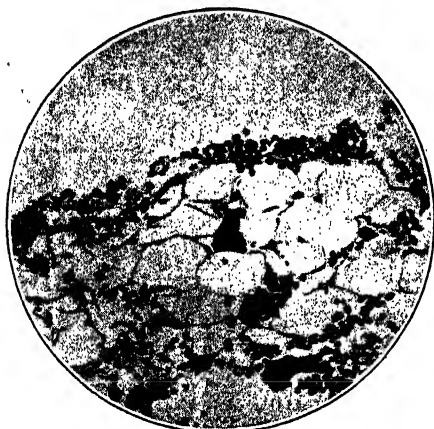


FIG. 2 (X 250). Note red bone marrow in which megakaryocytes are conspicuous.

High power (see Fig. 2). With this, the various elements of red marrow, occupying the spaces of the osseous tissues, could be easily seen. Prominent were the developmental forms of erythrocytes, megakaryocytes and eosinophilic myelocytes.

On considering this variety of metaplasia, it seems remarkable that bone should have replaced muscle, in other words, that cells, presumably connective tissue cells, should ultimately be

changed into osteoblasts.

I desire to thank Dr. A. D. Thomas for arranging for preparation of the sections.

REFERENCE.

- Cowdry, E. V. (1928). *Special Cytology II*, 719. Paul B. Hoeber, New York.
Joest, E. and Schieback, P. (1924). *Über Herzwandverknöcherung Virchow's Archiv*. Vol. 253. 472.

THE USE OF CHLOROFORM IN PIG SLAUGHTERING.

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It is well known that certain drugs administered medicinally to animals prior to slaughter, are apt to give their characteristic odour

to the meat. Chloroform is one such agent, but no information seems to be available as to its effect on "cured products" such as bacon and hams. With a view to ascertaining what effect chloroform has on the taste and smell of bacon and hams, and in reply to an enquiry as to the possibility of the use of chloroform anæsthesia in pig slaughtering, I recently obtained permission to test the matter on a pig at this factory.

The subject chosen was a cross bred Large White Bacon pig about eight months old, weighing 10 scores 5 lbs. dead. It was decided to anæsthetise the animal, and to slaughter it by "sticking" with a knife in the throat in the ordinary way, whilst under the influence of the anæsthetic. The anæsthetic used was a chloroform and ether mixture (2 parts chloroform to 1 part ether). An anæsthetising mask was made from an empty patent food tin, the bottom of which had been pierced by numerous holes to allow air to circulate freely. A pad of cotton wool was inserted into the "mask," the anæsthetic being poured on to this pad.

The pig was driven quietly into the "hoisting pen," and a rope slipped into its mouth, the noose being over the upper jaw. The loose end of the rope was thrown over an iron rail above the animal, and held firmly by one man, whilst another man kept the pig's hindquarters against the side of the pen. The mask was easily inserted in position over the snout, and a piece of sacking placed over nose and mask, leaving the perforated end of the mask free so as to allow a plentiful admixture of air with the anæsthetic vapour; this being considered necessary in view of the fact that the animal was of the fat bacon variety. A fat pig is not an ideal subject for a general anæsthetic, and I therefore decided to proceed slowly with the administration. An initial dose of four drachms was administered, and a plentiful supply of air allowed. The animal was given about a minute to inhale the mixture, which it did very quietly, and with no struggling, merely emitting a few squeals and grunts. The mask was then removed and another four drachms of the mixture poured on to the cotton wool, the mask being replaced immediately, with the piece of sacking covering the air holes. The pig was still able to obtain a supply of air, but the concentration of the anæsthetic was now greater. In about 30 seconds the subject passed into the stage of excitement, followed by general anæsthesia, manifested by sinking to the ground.

The mask was retained over the nose, and the body hoisted by means of a shackle on one of the hind legs. The mask was removed as the animal left the ground, and, whilst still unconscious, the throat was cut in the ordinary way. The time taken from placing the mask over the pig's upper jaw, until hanging ready for bleeding, was about five minutes. This time could have been shortened by the adminis-

tration of a stronger initial dose of the anæsthetic ; but, as the animal was very fat, this was considered too risky.

One ounce of chloroform and ether mixture was used.

The animal bled well, but the blood was rather darker in colour than normal. It was collected, and weighed $6\frac{1}{4}$ lbs. which is quite good (average from a pig killed in the ordinary way is from 6 lbs. to $6\frac{1}{2}$ lbs.). A strong odour of chloroform was noticeable, being more pronounced after the blood had been allowed to stand in an open pan for about half an hour.

The carcase and offal were then examined. The lungs appeared well drained of blood, and on cutting into them the characteristic odour of chloroform was most pronounced. In the heart, both auricles and ventricles contained dark blood clots with strong chloroform smell, which persisted after opening the cavities and washing them free of blood clots. There was no pronounced odour of chloroform in the stomach or bowels, and as these organs were examined fresh on removal from the carcase, it is possible that their normal odour may have masked that of the chloroform. All organs appeared well drained of blood, and normal to the naked eye.

The carcase, after disembowelling and splitting down the backbone, was carefully examined. The two sides appeared quite normal and well bled. A strong smell of chloroform emanated from the throat region, at the site of the slaughter wound. The kidneys, and beneath the peritoneal fat, were similarly tainted. The head also smelt strongly of chloroform.

Two hours later. The carcase was placed in a favourable position to cool and "set," and on examination two hours after slaughtering the two sides had a most pronounced odour of chloroform, especially noticeable on cutting into any part of the flesh. This was almost like smelling the pure anæsthetic itself.

Twenty-four hours later. The carcase had "set" properly, but the chloroform odour was still more pronounced, and could be distinguished on approaching the two sides. It was unnecessary to cut into the flesh to get it. The lungs, heart and liver also smelt strongly of chloroform.

The head was boiled and a portion tasted. It had a very peculiar, sweet taste, quite unlike ordinary boiled pork.

The hocks, trotters, diaphragm, and trimmings, were all pickled. A strong smell of chloroform was present in all these after pickling.

Ten days later. The two sides were "cured" by the "dry" process, and were ready for examination ten days after slaughtering. Both sides had "cured" nicely, but on cutting into them the odour of chloroform was most pronounced, and could easily be distinguished on inserting the "Trier" (the steel skewer used in testing for "taint").

Slices of the bacon were fried and tasted. Again the sweet taste of chloroform was most noticeable.

Forty-seven days after slaughter. The two hams were brought out of the curing cellars, and on cutting portions off the surface, as well as by the use of the "trier," the odour of chloroform was quite pronounced. The hams were next sent into the drying rooms, and were examined again *seven days later* (i.e. fifty-four days after slaughtering). The hams were cut in halves, and slices cut out and fried. The meat smelt strongly of chloroform, and on tasting the cooked slices the sweet characteristic chloroform taste was unmistakable.

From the foregoing it is apparent that chloroform, administered to a pig prior to slaughtering, will persist in the flesh for at least eight weeks, and that the process of curing and pickling does not seem to affect the drug in the tissues. The hams and sides were cured by the "dry cure" process, and there is no question of them not "taking the salt." Experts here pronounced the "cure" as one of the best they had seen.

ATYPICAL B. PULLORUM INFECTION IN YOUNG CHICKS.

By N. S. BARRON, M.R.C.V.S.,

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IN the course of the investigation of an outbreak of disease in young chicks due to *B. pullorum*, lesions of a well marked and unusual character were met with by the writer. The history of the condition was atypical in several respects.

Those who have had the opportunity of examining large numbers of outbreaks of Bacillary White Diarrhoea in chicks realize how infrequently *B. pullorum* produces pathological alterations in the bodies of affected birds which can be regarded as definitely diagnostic of the presence of the disease. The history of a typical outbreak, however, reveals a number of facts which are of importance in investigation. It usually shows that deaths commenced to occur almost from the first day of hatching and that they continued well up to the end of the second week, with the heaviest mortality between the eighth and twelfth days. An inquiry into the origin of the eggs laid down frequently affords the clue as to how the disease was introduced on to premises where it had not previously occurred. As the name of the disease implies, one of the commonest symptoms is the occurrence of a whitish diarrhoea, but this is not always a prominent feature in the early stages of an outbreak. Moreover, the droppings may normally

show some variation in consistency, and as they contain a large proportion of urates secreted from the urinary system, they are of a whitish streaky appearance. A common symptom of B.W.D. is the "pasting up" of the cloaca due to matting of the adjacent down with semi-fluid excreta, but this may also occur in other conditions, as, for example, in coccidiosis and various non-specific intestinal disorders.

In some cases there are no macroscopic lesions to be observed at autopsy, but the following appearances are frequently seen and described, though they are not necessarily indicative of the presence of this disease :—

(1) THE PERSISTENCE OF THE YOLK SAC.

For the first seventy two hours of its life the chick lives entirely upon yolk derived from the egg from which it was hatched. This is stored in the abdomen in the yolk sac from which it is gradually absorbed. Normally this structure has disappeared by the fourth or fifth day, although it has not infrequently been found to persist for as long as nine days in the apparent absence of any pathological or bacteriological condition (Schilling and Bleecker¹). The persistence of the yolk sac in cases of *B. pullorum* infection has been explained on the supposition that, the condition being septicæmic, the presence of the organism in the yolk sac may bring about changes which retard absorption of its contents.

(2) THE YELLOWISH STREAKY APPEARANCE OF THE LIVER.

The liver of very young chicks is normally of a pale yellow colour owing to the presence of absorbed yolk. As absorption of this material declines, the organ takes on a streaky appearance, and when the process has terminated it assumes a mahogany or chocolate colour. The streakiness is not, therefore, in itself an indication of a disease process, and may persist for a longer period than normal as the result of a diminished rate of yolk absorption arising from any cause.

(3) NODULES IN THE LUNGS.

These lesions are not constantly found, but they afford a fairly useful indication of *B. pullorum* infection. They take the form of rounded, yellowish grey firm nodules, the size of a pin's head, embedded in the lung tissue. The organism can be isolated from these nodules.

History of the Case under Discussion.

The owner had purchased twenty-five valuable Rhode Island Red hens as a nucleus from which to build up a good quality flock. The first two batches of chicks hatched from the eggs of these birds presented no suspicious symptoms and although the total rearing losses

were rather heavy, amounting in all to 18 per cent., the owner was inclined to attribute them largely to the very severe weather experienced during the early spring of this year. The third batch of chicks progressed in much the same way until the sixteenth day, when the mortality suddenly became heavy and ultimately reached a total of over 40 per cent. Before death the birds became mopy, but showed no evidence of diarrhoea.

A *post-mortem* examination of two of these birds was made and the following lesions observed.

In each instance the gizzard, although normal in size and consistency, showed very striking, prominent, discrete, pale yellow, caseous nodules, some being visible superficially and others embedded deeply in the muscular walls. They measured 3-4 mm. in diameter, and were not encapsuled. Similar lesions were also present along the course of the duodenum protruding from beneath the serous coat. They presented a pale yellowish white rounded surface, but were somewhat less prominent than the lesions in the gizzard though rather firmer in consistency. The appearance and distribution of the nodules in the intestine and gizzard reminded one strongly of the picture presented by these organs in some cases of tuberculosis in the fowl. The liver was of normal consistence but showed numerous minute greenish yellow translucent areas scattered throughout its substance. The heart wall in each case presented four or five pale yellow fat-like nodules embedded in its substance and visible superficially. The cæca were slightly dilated and contained somewhat firmer contents than usual. No coccidia or other parasites could be detected.

At a later date a number of chicks were examined from a fourth batch in which the mortality became heavy about the tenth day. Lesions of a similar type were found in these, but they were not developed to the same degree being far less prominent in the heart and liver and not quite so well defined in the gizzard.

Bacteriological Examination.

A pure culture of an organism resembling *B. pullorum* in its morphological, tinctorial and cultural characters, and in its fermentation reactions was isolated from the heart blood, the nodules in the liver and gizzard, and the bone marrow. An emulsion of the organism prepared soon after isolation was tested with a stock agglutinating *B. pullorum* serum, but failed to show any reaction. It was not until the strain had reached the fourth generation in artificial culture that it became agglutinable and it was then found to be completely agglutinated up to the titre limit of the serum.

It was decided to carry out a blood test of the twenty five hens.

which produced the eggs from which these chicks were hatched, and as a result thirteen of them gave a positive reaction. It was also ascertained that an average of 20 per cent. of fertile eggs had failed to hatch.

The outbreak was of interest as showing a subacute form of *B. pullorum* infection due, in all probability, to the strain involved being of less than the normal virulence. It would appear that cases of this kind are of somewhat rare occurrence. The only description of a similar condition which we have seen in the literature is a comparatively recent one by Truche and Bauche². These authors describe an outbreak in which deaths occurred in chicks from 10 to 15 days old. The lesions observed were tubercle-like nodules in the lungs, gizzard and heart, from which *B. pullorum* was readily isolated. The heart blood and cerebral pulp proved to be sterile in the majority of cases.

REFERENCES TO LITERATURE.

1. Schilling, S. J., and W. L. Bleecker. Absorption Rate of the Reserve Yolk in Baby Chicks. *J.A.V.M.A.* 1928 Feb. N.S. Vol. 25, No. 5, p. 618.
2. Truche, C., and J. Bauche. Nodules D'Aspect Tuberculeuse dus à *Bacillus pullorum* chez le Poussin. *C.R.S.B.* 1929, Tome C, No. 12, p. 989.

Clinical Articles

Contagious Abortion in a Donkey Stud.

By MAJOR H. ALLEN, O.B.E., R.A.V.C.,

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Introduction.

THE Donkey Stud in Mona Remount Depot is maintained for a single object in order to breed Jacks or Donkey Stallions for drafting into the different breeding areas for the purpose of Mule Breeding, and to curtail the expense of importation of foreign Jacks. As far as size and conformation is concerned, the Punjab even so far south as Hissar can breed as good donkeys as anywhere in the world. Some Mule Breeding authorities say that there is no comparison between mule stock got by India Country Breds and imported Jacks (American Catalonians), and that the former get much better stock. Country Bred Jacks are slow "coverers," but nearly all do "cover" if persisted with, and the majority are good stock getters.

The imported American Jacks get a large proportion of mules which are difficult to place, as they are inclined to be big and leggy and

light of girth. The country bred Jacks get a number too small for Mountain Batteries, but they can be classified as Army Transport, etc., and there is always a large demand in India outside the Army for small mules, but none for big. I do not think contagious abortion in a donkey stud an insuperable difficulty. One naturally gets losses but donkeys breed readily, and one can generally obtain a good percentage of normal foals in spite of the disease.

History.

The stud was started in 1904, and reached its authorised number of 80 mares during 1906.

Mares were purchased from ten centres, which included the Punjab, Baluchistan, and North-Western Frontier provinces.

Thirty-two mares were received in-foal.

The purchasing of such a large number of full aged mares from so many centres in different districts and provinces, a large proportion in-foal, and some probably barren or recently aborted was in my opinion a dangerous procedure. The disease has now been proved to be widespread in parts of India, in particular Northern India. I know of at least seven studs in the Punjab where the disease has existed. In 1925 the strength of mares at the stud was reduced to 50. Replacements in the stud are maintained by stud-bred fillies. The stud was grazed over large areas of permanent pasture from the start of the stud until 1916. There were 19 abortions and 22 full-time born dead foals during 1914-15. The disease, I am justified in saying, obtained a foothold in the stud during 1907. The stud was split up into three parts during January, 1927. The results of agglutination tests carried out by the Director of Imperial Institute of Veterinary Research, Muktesar (India), revealed the fact that the stud was heavily infected (*Vide* Table No. 5).

The Agglutination Test.

This is of practical value for the following reasons :—

1. It establishes a diagnosis of infection in a stud.
2. Determines extent of infection in that stud.
3. Testing animals to be added to clean stud.
4. Dividing stud into suspicious, reacting or infected, and a clean stud.

The test may not pick out recently infected animals. A reaction to the test does not mean that an animal has aborted, or that it will eventually abort. Animals may abort if agglutination titre is low. Abortion may take place before full complement of agglutinins are in the

blood. All supposedly clean animals should be re-treated after six months to one year. All animals negative to the first test should be re-tested after about three months.

Case Histories.

A review of the first five mares which entered the stud is of interest:—

Mare No. 1.—Had been empty in 1904 and 1905. Aborted on 29.7.07 after 8 months.

Mare No. 2.—Received in stud during 1903. Colt born on 2.5.05, died after three days. Aborted on 26.5.07 after ten months. Aborted on 14.6.09 under 5 months. Filly and Colt (twins) born on 2.11.10. Filly died after six hours, colt after one day.

Mare No. 3.—Empty from 1904 to 1906. After 1906 aborted three times. One full-time dead foal, one under 6 months, and one under 9 months. Living foal was born on 1906, and was afterwards empty six times in one year.

Mare No. 4.—Aborted in 1907 after ten months. Full-time dead foal born in 1915. Living foals in 1905, 1906, 1909, 1910 and 1912. Was empty eleven times in 10 years (1904 to 1914).

Mare No. 5.—Was eight years of age when received in stud on 22.3.04. Had been empty for three years. Was not covered for one year (1908). Was kept in stud for four years and on the 3.3.08 was destroyed on account of suffering from chronic endo-metritis. This mare, in my opinion, was a barren mare at time of purchase, and in every likelihood a "carrier" of the disease. Muktesar researches indicate that animals may "carry" infection for two or three years or longer; sometimes they then become clean; and instances are on record of these animals becoming reinfected again.

Webb in "Abortion in a Donkey Stud," *Journal of Comparative Pathology and Therapeutics*, Vol. xxii, No. 4, 31st December, 1909, p. 289, lays the blame of starting the disease on mare No. 84.

Mare No. 6.—Was six years of age when purchased on the 18.2.07. Received in-foal. Aborted 7.5.07, at about seven months. Aborted 8.4.09 after five months. A colt died five days after foaling on 6.7.10. Foaled a living filly on 27.8.08. Living foals—seven. Empty 14 times. Destroyed on the 4.11.17.

Maintenance of Stud.

All donkeys in the stud, mares, colts and fillies are stationary in dry paddocks but are removed to foaling boxes about two weeks before expected time of foaling. Mares which are going to abort

usually show the following premonitory symptoms :—They are dull for about two hours previous to aborting and then show colicky symptoms for a half hour or so. They abort as a rule under three hours. The process seems to be a sudden one, evidently on account of the chorion coming away so easily in mares. The health of the donkey mare does not seem to be in the least impaired.

With mares which are fed in dry paddocks, the conditions are not favourable for intensification and massive spread of the infection. The disease however remains latent, which has been proved to be the case in Mona Stud as the results of the numerous agglutination tests. A large proportion were found to be infected (*Vide* Table No. 2). Transmission in the Mona Stud is by small quantities of infected material, and there is not much exaltation. The casual organisms evidently remain fairly stationary as regards virulence although over a period of years there are fluctuations and a serious tendency to spread the intensity in virulence during some years causing formidable losses to the breeding operations (*Vide* Table No. 1). The infection has now persisted in the stud for twenty-five years, and abortions have increased for a period of two to four years in virulence until it became serious, when full-time dead foals were included (*Vide* Table No. 1). There appears to be a fairly well defined periodicity in intensification in virulence of the disease.

Cause.

What is the cause of this enzooticity?—The disease spreads by ingestion, and the factors are a massive infection at times. The existing conditions are evidently favourable for exaltation of the chief causal organisms at times (*Vide* Table No. 1).

Bacteriological Results.

Bacteriological examination of material from aborted foetuses, and full-time dead foals by Muktesar were as follows :—

Heart blood swab, heart blood and stomach contents pipettes of the aborted foetus, or full-time dead foal are forwarded for bacteriological examination. Twenty-two examinations have been carried out to date, and three are at present under report which were despatched during May, 1929. Collectively speaking the chief causal organisms are the *B. Abortivo equinus* as well as other organisms belonging apparently to the colon paratyphoid group. Some showed a definitely positive result in that *B. Abortivo equinus* was isolated in culture. In some the results were not so clearly defined, in that

Coliform organisms were also present in culture. The Coliform organisms may conceivably have been the actual cause of the abortion, inducing resuscitation of *B. Abortivo equinus*. Other causal or extraneous or secondary invaders have been demonstrated.

B. Subtitis, *Streptococci*, *Staphylococcus aureus*, *albus* and *citreus*, *B. proteus*, *Escherichia acidilactici*, Coliform organisms of the genus *Flavo-bacterium*, *Sarcinæ*, Diphtheroid organisms, Coliform organism of genus *Eberthella*, and *B. alcaligenes* were isolated in mixed growths. These results are almost valueless as it is impossible to interpret the results as either positive or negative. The *B. Coli* are evidently exalted bowel saprophytes by passage. *Streptococcus* (*S. faecialis*) are also exalted saprophytes. The *B. Abortivo equinus* belongs to a peculiar group of coliform organisms known as *Salmonella*. It is connected with the food poisoning group of organisms. They all produce very powerful toxins. The organism is identical in all particulars with that found in America and Europe.

Vaccination.

Wholesale vaccination by the subcutaneous inoculation of cultures of the causal organisms (*B. Abortivo equinus* cum *B. Coli*) killed by heat was adopted during the past Covering Season (1928-29) in place of the "wearing out" process.

The chances of setting up a useful immunity against the common form of equine contagious abortion seem to be considerable, especially as all strains of *B. Abortivo equinus* examinations by Muktesar would appear to have fallen within a single seriological group. Vaccination directions as issued by Muktesar :—

10 c.c. to be injected as follows :—

1st injection	first after serving	.....	.....	.....	1 c.c.
2nd	„ one month after	.....	.....	.....	2 c.c.
3rd	„ 3 months „	.....	.....	.....	3 c.c.
4th	„ 5 „ „	.....	.....	.....	4 c.c.

Each dose to be injected subcutaneously at side of neck.

If incidence of the disease is very heavy and severe, dose given at 4th injection may be repeated at the 7th month and again, perhaps at the 9th month. All donkey mares served in the Mona Stud have received six injections. The results of one year's vaccination will be seen in Table No. 2 as compared with two non-vaccination years. The results of last covering season are not as hopeful as was expected. It is, however, being given another season's trial. Vaccination has failed in some instances against the homologous specific infection.

Stallion as Disseminator of Infection.

The stallion has been said to sometimes spread the disease. Some German workers say that he can spread the disease. The relation to the spread of the disease probably depends to a large extent upon whether he is infected or not (*Vide* Table No. 2). It is said that abortion cannot be produced by introduction of organisms per vaginum (Schroeder's experiments). What is the channel of infection in the stallion, and what percentage ejaculate *B. Abortus equinus* with the semen? These points have not yet been conclusively determined. In the outbreak at Government Cattle Farm, Hissar (South Punjab), Doyle says that there is no evidence pointing to the stallion as a disseminator of the disease.

Period of Incubation.

The incubation period on an average is in donkey mares nineteen days following experimental infection (Doyle). Branford and Doyle say that it may extend to six weeks in natural infection.

Table No. 1.

PERCENTAGE RESULTS OF COVERINGS.

Financial Years (1st April to 31st March).	Normal Foals.	Abortions.	Total.	Full-time Dead Foals and Mares died in Foal.	Sum Total.
1904-5	50.0	—	50.0	50.0	100.0
1905-6	57.14	—	57.14	—	57.14
1906-7	83.8	—	83.8	2.6	86.4
1907-8	24.2	16.6	40.8	28.8	69.6
1908-9	48.0	10.67	58.67	16.0	74.6
1909-10	45.6	13.9	59.5	6.3	65.8
1910-11	56.7	18.9	75.6	10.8	86.4
1911-12	57.4	4.4	61.8	2.9	81.0
1912-13	54.0	8.1	62.1	18.9	81.0
1913-14	60.0	7.6	67.6	7.6	75.2
1914-15	42.5	10.0	52.5	13.7	66.2
1915-16	33.3	21.2	54.5	25.5	80.0
1916-17	50.0	18.7	68.75	3.75	72.5
1917-18	51.7	15.3	67.0	9.4	76.4
1918-19	52.9	9.2	62.1	10.3	72.4
1919-20	67.9	2.6	70.5	7.7	78.2
1920-21	59.7	10.9	70.6	9.8	80.4
1921-22	46.4	13.1	59.5	10.7	70.2
1922-23	52.4	13.4	65.8	11.0	76.8
1923-24	36.4	7.5	43.9	12.1	56.0
1924-25	63.7	6.2	69.9	7.5	77.4
1925-26	51.9	11.7	63.6	14.3	77.9
1926-27	32.7	14.5	47.2	7.3	54.5
1927-28	60.0	8.0	68.0	10.0	78.0
1928-29	56.81	6.81	63.62	6.81	70.4

Table No. 2.**AGGLUTINATION TESTS DURING 1925-26.**

Animals Tested.	Carried out by Muktesar.					Negative.	Total No. of Testings.	Total No. of Animals Tested.
	Undoubtedly Infected.	Infected but less marked.	Suspicious.	Suspicious, but less marked.	Slight reaction.			
Donkey Mares	39	5	22	14	38	32	150	54
Donkey Fillies	8	—	8	6	15	41	78	65
Donkey Stallions	8	1	3	3	2	—	17	9
T. P. Mares	5	—	3	1	7	8	24	11
Sum Total	60	6	36	24	62	81	269	139

Immunity.

Is not so durable in the mare as in the cow, and not so readily acquired.

Joint-ill.

During the past three years (1926 to 1929) I have not seen a case of joint-ill associated with specific abortion in the stud. Doyle failed to set up joint-ill in foals either by intravenous or alimentary infection. Intravenous inoculation of the organisms produced arthritis in three adult animals (two pony mares and one donkey stallion) (Doyle).

Summary.

1. Mona Donkey Stud is maintained for the single purpose of breeding Jacks, in order to reduce the number of imported jacks. The Indian C.B. jack has got size, weight and good conformation. He is a slow coverer, but a good stock-getter

2. Mona Donkey Stud dates from 1903. Full complement of mares (80) was reached during 1906. Present strength of mares is 50.

3. The disease is widely spread in parts of India.

Table No. 3.

STATEMENT SHOWING COVERING SEASONS AND FINANCIAL YEARS FOR THE PAST THREE YEARS IN DONKEY STUD, REMOUNT DEPOT, MONA.

	No. of Full-time Foals Living.	No. of Abortions 6-8 months.	No. Born Dead Full-time.	Mares Cast and Sold in-foal.	Mares Died in-foal.	Mares Strayed in-foal.	Empty.	Total No. of Foals.	Total Abortions and Born Dead Full-time.	Foaling Percentage.	Percentage of Abortions and Born Dead Full-time.	No. of Coverings.	Remarks.
1926-7 Covering Season	18	9	4	—	2	—	28	33	13	54.09	39.39	61	
Financial Year.	18	8	2	—	2	—	25	30	10	54.55	33.3	55	Financial Year—1st April to 31st March.
1927-28 Covering Season	25	2	3	2	1	1	12	34	5	73.91	14.70	46	Covering Season—1st March to 28th February.
Financial Year.	25	4	4	3	1	1	11	39	8	78.0	20.5	50	Three cast and sold, one strayed and (3) three died, all were in-foal and are included in this statement.
1928-29 Covering Season	27	5*	3	1	—	—	15	36	8	70.58	22.22	51	
Financial Year	25	3*	3*	—	—	—	13	31	6	70.45	19.35	44	* One positive to B. Abortus equinus. Eight negative to B. Abortus equinus. All mares at Stud throughout 1928-29 were vaccinated.

4. Agglutination tests (269) showed that the stud was heavily infected (*Vide* Table No. 2).

5. Probable cause of introduction of infection into the stud was mare No. 5. On purchase in 1904, she was barren, and a "carrier."

6. All mares and young stock are kept in "dry" paddocks and have not been grazed since 1926. Mares foal-down in foaling boxes.

7. The disease exists in a latent form. Transmission is by small quantities of infected material, and there is not marked exaltation. Causal organisms remain fairly stationary as regard virulence. Over a period of many years (1904 to 1929) there are fluctuations, and a tendency to spread and intensify in virulence some years.

8. Infection has been in stud for 25 years.

9. The chief causal organisms are the B. Abortivo equinus and other organisms belonging to the colon paratyphoid group.

10. Vaccination has been practised on all mares covered in stud during 1928-29 covering season (*Vide* Table No. 3).

11. All Jacks subjected to agglutination test showed certain degrees of reaction (*Vide* Table No. 2).

Appreciation.

I wish to thank Dr. Edwards, D.Sc., M.R.C.V.S., the late Director of Imperial Institute of Veterinary Research, Muktesar (India), in particular, and his staff in general for the ungrudging help and advice they have given me during the three past years in connection with contagious abortion in the Mona Donkey Stud. The number of agglutination tests, bacteriological examinations, and preparation of vaccines entailed a considerable amount of special technique work.

REFERENCES.

- (1) Webb, E. C., "Abortion in a Donkey Stud," *Jnl. of Comp. Path. and Therap.*, Vol. xxii, No. 4, December 31st, 1909, p. 289.
- (2) Branford and Doyle. "Notes on Contagious Abortion in Pony and Donkey Mares," *Pusa Research Institute Bulletin*, No. 121 (1921).
- (3) Doyle, T. M. "Etiology of Equine Contagious Abortion," *Pusa Research Institute Bulletin*, No. 5, Vol. 111, October, 1922.
- (4) Branford and Doyle. "Notes on Contagious Abortion in Pony and Donkey Mares," *The Veterinary Journal*, Vol. 78, No. 2, February, 1922, pp. 69-75.
- (5) Edwards, J. T. Verbatim Post-Graduate Notes compiled at Laboratory Imperial Veterinary Research, Muktesar (India), 1928.
- (6) Correspondence on the subject during 1926 to 1929 with Director Imperial Institute of Veterinary Research, Muktesar (India).

Retention of Fœtal Membranes after Birth of Twin Calves. Left Uterine Horn Clean, Right Horn Unclean.

By HUGH BEGG, F.R.C.V.S.,

County and District Veterinary Inspector, County Offices, Hamilton.

OF all the cows from which I have removed, or attempted to remove, the retained fœtal membranes I cannot recall a case exactly similar to that which I now relate. I recollect, however, that Messrs. McFadyean and Stockman put on record a twin pregnancy in which one horn was apparently normal while the other contained a large quantity of exudate.

The subject was a four years old pedigreed Ayrshire cow at her second pregnancy, and a member of a herd in which abortion appeared two years before, most of the cows being vaccinated for two consecutive years.

It was reported by the attendant that the cow had gone two days past her time as reckoned in these parts, where the period of gestation is expected to extend from eight to sixteen days beyond the estimated day. The animal, therefore, had calved a little prematurely, and the appearance of the retained membranes and the uterine exudate were characteristic of contagious abortion.

I examined her forty-eight hours after calving, and was informed that very little of the membranes had been extruded. The hand passed readily through a wide os into an apparently single large cavity, the complete length of which I failed to explore with my arm bare to the shoulder. The cavity contained almost no exudate and only a few loose shreds of unattached placental membrane. I irrigated the cavity with two gallons of weak disinfectant solution which the cow readily voided with little discolouration, though curiously this was followed by some typical concentrated exudate. Exploring again, it was found that this (the left horn) cavity contained almost no fluid. The attendant still maintained that there could be no mistake that the cow had only parted with very little of her cleansing. Wishing to induce uterine contraction, I injected two gallons of lukewarm water into the cavity, and this was very soon returned almost unchanged, though followed as before by some characteristic uterine discharge. Exploring the cleansed cavity, one could feel on the mucosa of the posterior part protuberances to the number of about eighteen, which undoubtedly marked the sites for cotyledons, but so small that they could not have held cotyledons that had functioned for one of the two calves born dead forty-eight hours before. The mucosa of the anterior two-thirds of the cavity was as severely plain on all sides as

the wall of the rumen, which could be felt on the left. Withdrawing my hand from this clean horn it was filled with exudate when near to the os uteri. Palpating the right wall of the os in order to explore for the entrance to the other horn, which I had not yet been able to enter, I found that what at first seemed solid wall tissue was separable, and with the fingers I pulled to the left a heavy upright partition with a thin posterior border, the edge of which was as near as three inches to the external opening of the os. The hand and arm then entered the right horn, which contained the macerated membranes and a large quantity of typical discharge. I dealt with this as best I could for a time, but lack of reach hindered a satisfactory completion of the job.

Although the cow's temperature was 104.3° , there was such evidence of increased tonicity of the uterine walls while I was operating that I was hopeful regarding the case. Forty-eight hours later the temperature was 101.6° , and it was not possible to insert the hand through the os, but discharge was issuing freely. Examining my soiled hand, it was seen that the dirty discharge was plentifully mixed with tenacious gelatinous material, which webbed the fingers when the hand was spread out. I have always regarded the presence of this material as of salutary significance. It is always absent, in my experience, when the case develops into one of septic metritis. Nevertheless, within a few days signs of sapræmia were present, all four limbs being rounded and swollen to well above the hocks and knees. She was treated with Salol pessaries, and though she lost some condition for a time she was put back in the herd after six weeks clean-limbed and yielding three and a half gallons of milk daily. She never came into season again, and was fattened off.

I suppose it is likely that both of the twins, which were of fair size, were nourished from the right horn of the uterus, and that the left horn was occupied to some extent by one of the fetuses.

Arsenical Poisoning in the Field.

By U. F. POLLÖCK, M.R.C.V.S.,

Department of Agriculture, New South Wales.

THE subject matter of this paper has been acquired as the result of personal investigation of cases encountered in the Tick Quarantine Area of New South Wales during the last 18 months.

In considering the question of arsenical poisoning, the matter of degree merits the closest investigation, and one is severely handicapped in the case of cattle, which are necessarily dumb, while an account of

all the reactions experienced by a human may be obtained from the patient and very materially aid in diagnosis, besides adding, perhaps, to pre-existing knowledge on the subject. Thus, in cases of arsenical poisoning not attended with fatal results, one has only the often obscure outward signs to go on, evidence so applicable to other conditions that a positive diagnosis cannot be made with any degree of certainty. In such instances, one can resort to testing samples of urine ; this I hope to adopt as a routine procedure in future.

Here is room for research, since all cattle submitted to dipping absorb a certain quantity of arsenic from the dip-fluid, and the analyst will need to determine from a series of experiments what constitutes a normal amount of arsenic in a dipped beast, before the analysis figures of a suspected case of poisoning hold any significance.

Stockowners have told me of cases in the past where beasts showed ill-effects soon after dipping and gradually pined away. Such cases, when reported, are now personally investigated and a *post-mortem* examination held. Where a beast had lingered for upwards of three weeks, it is perhaps possible that, as in man, arsenic will not invariably be found in viscera or tissues, but one can expect arsenic to be demonstrable in urine for about 12 days following its ingestion. This paper will, therefore, treat mainly of Arsenical Poisoning attended with fatal results.

Cause.

My experience to date has pointed to the ingestion or inhibition of the mineral as being directly causal. The beast, while immersed in the dip-bath, drinks some dip mixture or licks up concentrate solution which has been spilled on the ground.

Many proprietary weed-killers, of course, contain arsenic in varying proportion and combination and these, through careless handling, are at times responsible for fatalities amongst stock.

It has been suggested that death may result from spraying a beast with arsenical solution, arsenical poisoning being set up by absorption of arsenic cutaneously. This is very questionable with strengths ordinarily used for treatment of stock. That fatal poisoning can occur from absorption through healthy skin I have no evidence, though death has occurred from exhaustion consequent on severe dermatitis (commonly called "scalding") set up through treating stock with arsenical fluids.

It is recognised that poisoning may result from application of arsenic to a wound or tumour, but the channel of entry into the system is here quite different, as the natural resistance of the animal's skin has not to be overcome.

One authority, speaking of sheep, says that arsenic is not absorbed through the healthy skin, but, as far as cattle are concerned, this is false, as it is now well known that arsenic is absorbed into the circulation following on its application in solution to the skin. The question as to whether sufficient can be absorbed as to cause death is to some extent dependant on the strength of the solution applied, but it is a reasonable assumption that solutions up to a certain strength will not cause fatal poisoning through cutaneous absorption, and that solutions beyond a certain strength will occasion a dermatitis in itself sufficient to account for the cause of death.

Adverse weather conditions and fatigue, when associated with dipping of cattle, are definite factors in the causation of mortality.

There is no doubt that immersion in an arsenical fluid renders cattle more susceptible to the effects of heat, especially of the humid type, and renders them less able to withstand the fatigue of travel. When cattle are overheated or pushed along under trying weather conditions, deaths are apt to occur from the combined factors of heat fatigue and dipping.

In estimating the cause of death in such cases, quantitative analyses of viscera and organs are carried out by the Board's Analyst, Mr. Cohen, employing a system which will demonstrate the presence of arsenic in quantities down to 1/1000th grain.

The essentiality of this procedure is appreciated here, as one has to weigh the pathological changes noted in *post-mortem*, and estimate just how much one condition influenced the other, and what actually caused death; his finding thus weighs the evidence, and permits of a definite decision.

Inflammation has been noted in lung, stomach and bowel which, were the history of the case unobtainable or at fault, might have been considered to have resulted directly from inhibition of arsenic. When however, a quantitative analysis yields arsenic to the extent of merely 1/250th grain per lb. tissue, the mineral can hardly be regarded as other than associated with the ultimate cause of death.

Symptoms.

Various symptoms, such as purging, vomiting, colic, etc., have been given by text books as symptomatic of arsenical poisoning, but the trouble is that such features are by no means diagnostic and might also be due to other mineral and plant poisonings, while in a proportion of cases they are definitely absent.

Scouring, as a rule, is in evidence, varying from simple purging to violent muco-hæmorrhagic discharge. In some cases of fairly acute nature it was absent.

Colic, or evidence of pain, is commonly reported by the owner. One might sum up his evidence by saying that, following dipping, the cow became "dopey," went off her milk and hung about, disinclined to feed; later, found dead.

Abnormal thirst is a symptom fairly frequently noted.

Coldness of the extremities is also noted in some cases. In one instance, amongst some 30 animals of a herd of 70, a large œdematous swelling appeared, involving the abdomen along the middle line. Some of these rivalled the udder in size, but various sizes in a downward grade were noted. They occupied various positions between the udder and brisket and were first noted on the day following dipping, an increase in size taking place up to the fourth day, after which they started to subside. Seven days later an Inspector noted six cases; on the eighth day I myself saw two. The swelling on one was the size of half a football and pitted on pressure. Loss of appetite was not an accompanying feature, nor was milk yield lost. Whether the condition resulted from the action of arsenic or not, I was unable to determine.

It is exceptional for me to examine a beast sooner than two days following dipping, owing to delay in reporting the case and time necessarily lost in travelling to the holding. Often, the animal is dead or *in extremis* when I arrive.

As to how long an animal survives following the fatal intaking of arsenic, death generally supervenes in from one to seven days, symptoms being in evidence where the beast survives the first day. I have never known a beast under continual observation to be apparently normal for two or more days, and then suddenly succumb.

Dosage.

In the majority of cases it is impossible to gauge the exact quantity of fluid imbibed, other than by an estimate based on a quantitative analysis of tissue. It has been estimated, however, that a quart of arsenical solution containing, approximately, 32 grains of sodium arsenite will cause death inside 48 hours in the majority of cases. It is possible that 20 to 30 grains would serve as a lethal dose. The minimum lethal dose varies, of course, according to the degree of solubility of the agent and the rate of absorption.

The solubility of the Departmental dip-fluid remains constant, but the quantity of ingesta in the alimentary tract naturally influences the rate of absorption so that a dose which would cause death, if coincident with an empty condition of the stomach and bowels, would not necessarily prove fatal were the animal carrying a full feed.

Antidotal Treatment.

Antidotal measures are adopted when indicated and where possible. A supply of antidote is kept at each dip shed for use in emergency.

If a beast is seen to have drunk any spray mixture or dip solution, our inspectors have instructions to immediately make up the antidotal mixture and administer it. The latter consists of solutions of Liquor Ferri Perchloridi and Magnesium Hydroxide in separate bottles. When needed these are mixed with the addition of water and the solution is then ready for immediate use.

The cases which terminate fatally are generally discovered too late to permit of the effective use of antidote. I have, however, used it with success in one case where the inhibition of a lethal dose was highly probable.

Post-Mortem Appearances.

The skin is generally normal ; in only one case have I noted any departure, and the latter was limited to scurfiness along one side of the neck, loss of hair and toughening of the skin around one eye, which latter was possibly caused by prolonged contact with the ground when the animal was recumbent.

It is in the abomasum and duodenum that I look for characteristic change, and, following these, the rumen. In a typical case there is intense diffuse inflammation of abomasal mucous membrane, which is more or less continued in the duodenum for a varying length ; ulceration has been found affecting the abomasum in one case. A glairy, somewhat mucous discharge is also sometimes encountered here. The mucous membrane of the rumen may be cast off in places, displaying intense inflammation in the sub-mucous structures. If still adherent, it may be scraped off with the back of the knife even where the villæ are biggest, when the same inflammation will be apparent underneath.

Sometimes the reticulum and omasum are involved, but, as a rule, not to nearly the same extent. The inflamed tissues throughout assume a port wine colour of varying shades.

The bowels, apart from that part already mentioned, may display inflammation at intervals along their length, but are, as a rule, not very visibly affected.

The liver displays change, but not invariably in acute cases ; it has been found paler than normal, yellowish, distinctly yellow, and highly mottled (red and yellowish-brown) throughout its substance.

Dark hæmorrhagic areas, from pin-head to shilling in size, have been found in the heart, under the endocardium of the ventricles.

The kidneys may show congestion, but I have never found it pronounced.

Other lesions are absent, or imperceptible.

One thing that has struck me forcibly is the volume of food often found in the stomachs, which, from its appearance, must have been ingested when internal inflammation was at an advanced stage and, one would suppose, extremely painful.

Diagnosis

It was soon borne in on me that the history of the case enters very largely into *ante-mortem* diagnosis, whilst in cases of a sub-acute nature a recourse to chemical analysis is very desirable, and imperative where the history is at all confused.

It is a Departmental ruling that in cases where claims for compensation enter in, organic specimens must be submitted for determination of arsenic's presence in the tissues. As this latter work is carried out on the spot by Mr. Cohen, close co-operation is maintained between field and laboratory staff, and much valuable information readily obtained regarding the degree to which arsenic was cause. Diagnosis is, as already stated, mostly on *post-mortem* appearances.

The history of the illness is most often associated with dipping or arsenical fluid; in fact, now that compensation is paid for losses arising through dipping, all sorts of maladies—occurring within several weeks of dipping—are automatically attributed to that process, in the hope of pecuniary gain.

This brings up another consideration, viz. The Influence of Arsenic on Existing Disease. Where an animal is affected with disease, such as T.B., it may succumb soon after immersion.

Other cases, attributed by owners to Arsenical poisoning, have proved, on *post-mortem* examination, to be acute peritonitis, internal hæmorrhage and pernicious anæmia, but no connection was established here with the former.

In summarising, one can state that to diagnose arsenical poisoning *ante-mortem*, definite symptoms must be in evidence, backed by a history of access or possible access to the mineral.

For a positive *post-mortem* diagnosis, one must find some of the pathological changes before-mentioned, or demonstrate the presence of arsenic in sufficient quantity to warrant the assumption that death was due to arsenical poisoning.

Hypertrophic Nephritis.

By C. W. CARTWRIGHT, M.R.C.V.S.,

Dyserth, Flints.

CHRONIC renal disease in cattle probably occurs with greater frequency than is generally realised, and it is only when the condition

becomes acute or when secondary changes occur that its presence is detected.

SUBJECT. A fine aged Shorthorn cow in good condition was stated to be unwell for 2 or 3 days, though not regarded as serious as she continued to eat and chew her cud. On examination found her grunting a little at intervals, particularly on moving; temperature 102° ; mucous membranes slightly icteric, and a rather weak pulse of 80. Dung normal in colour and consistency, also urine clear in colour and passed without difficulty. On the right side in the hollow of the flank just behind the last rib an enlargement could be felt, pressure on which caused pain and the same applied to percussion over the liver. Per rectum both kidneys could be felt tremendously enlarged and the right in particular was very tender to the touch.

Next day cow much worse, weaker, temperature 105° , breathing heavily, anxious expression, and at that time having a very severe rigour, in fact, shaking all over.

For the first time the membranes were markedly icteric with fæces—urine of a very bright yellow colour. The owner, a very old man, insisted on treatment as she was an old favourite, so palliative measures were adopted. Two days later she became unable to rise, so he consented to slaughter.

Post-mortem examination showed both kidneys to be enormously enlarged, particularly the right, which had apparently torn itself from its attachments and was lying partially free and pressing directly on the liver—this pressure far exceeding the normal. Extensive hæmorrhage had occurred under its capsule, the layer of coagulated blood varying from 3 to 5 inches in depth. The kidney measured 16 by 10 inches, and though no facilities were available for weighing, it was estimated to be of at least 20 lbs. weight. The left kidney was less and showed no subcapsular hæmorrhage.

No abscess or pus foci were present and on section the parenchyma was firm and dense, appearing to consist largely of fibrous connective tissue. The liver with the exception of a very small sound area was soft, friable, and showed extensive fatty degeneration. In view of the above I attributed a nasty fall which this cow sustained the evening before her illness as the exciting cause of the acute condition, for prior to that she was apparently in good health and certainly in good condition.

Acute Eczema in Cattle Affecting only the Unpigmented Skin (the White Haired Parts of the Body).

By J. W. HALL MASHETER, M.R.C.V.S.,

Newnham-on-Severn.

THIS, to me, is an extremely rare occurrence in cattle ; in fact, in 36 years of practice, I have only seen one case and that occurred on 24/6/29, when I was called in to a second calf Friesian cow.

Symptoms.

The oncoming of the symptoms was very acute.

The cow, a dry cow in calf, was all right when turned out with the herd after milking, but before noon was noticed to be amiss, showing symptoms of colic—kicking abdomen with hind legs, throwing herself to the ground, and lying there prostrate for a time—rumen bloated—neck stretched out and showing severe dyspnoea.

I found on arrival all these symptoms together with a temperature of 105° F.—inability to stand, hair on hind quarters (*white parts only*), staring.

On passing my hand over these parts, they felt “rough,” and wherever my hand touched this was followed by a copious effusion of serum. Udder, which was entirely unpigmented, was tense and shining and the skin felt thick.

TREATMENT.

Purgatives (aloes) followed by sedatives and digestive tonics.

The cow was practically convalescent on the 28th, but had lost a lot of condition. On this day she gave birth prematurely (3 weeks) to a live calf. Placenta was retained which was manually removed 30/6/29.

Disquamation of the parts affected was beginning, and was practically complete by 9/7/29, leaving the skin denuded of hair, smooth and glistening.

Only the *white* parts of both hind quarters up to the umbelicus and the corresponding part of the dorsal region were affected ; the line of demarcation between the white and black parts of the skin being very distinctly delineated.

This case, showing such unusual symptoms, and the acute differentiation of the black and white areas of the parts affected puzzled me, although I remembered reading of this occurrence in the *Veterinary Record* some time ago, but, as usual, when one wants to find a particular case, it could not be found.

I then ransacked *The Encyclopædia of Veterinary Medicine and Surgery* and found, not any reference to cattle, but—"in horses a peculiar form (of eczema) is often met with affecting the *white skin* of the legs and face, and *frequently limited to those areas* in the particular patient " and " it is not uncommon for eczema to affect *white legs* or *white patches of skin* in horses.

" It has often been stated that the lesion in such cases is often due to too frequent washing and imperfect drying of the skin, but in the writer's view this is by no means the only or principal cause of the condition.

" He has frequently observed it affecting *white patches on the body* which have not been subjected to washing, and he has also frequently seen it occurring in a *single white leg* which has not been subjected to any different treatment or management from its fellows.

" He is of the opinion that the lesion in such cases is more likely to be due to a *tropho-neurosis*.

(Trophic [τροφή—I nourish] is a term applied to the influence that nerves exert with regard to the healthiness and nourishment of the parts to which they run. When the nerves become diseased or injured this influence is lost and the muscles waste, while the skin loses its healthy appearance and is liable to break down in ulcers.)

Pursuing my investigation of this condition, I turned to *Special Pathology and Therapeutics*, Hutyra and Marek, Vol. III, 3rd edition, and found that the condition was mentioned under "Eczema of Cattle."

Although my case did not occur under the dirty conditions they mention—the cow was out at grass during the recent hot, dry weather, and was perfectly clean so far as bodily cleanliness was concerned—they agree that "acute" eczema occurs only rarely in cattle.

They quote Mégnin who saw a recurrent eczema which had existed in a cow for three years—it began in the region of the loins with the development of little vesicles . . . finally the greater part of the upper portion of the body was attacked, although the affection was *limited exclusively to the unpigmented parts* of the skin. Also Mouroux observed a similar trouble in *spotted cattle*, which, however, began with general disturbances (loss of appetite, cessation of rumination, constipation and moderate tympany) as well as emaciation; *it attacked only the unpigmented parts of the skin* and persisted only during the warm part of the year, from May to October. The hair grew again later on in four-fifths of the cases.

This latter report coinciding fairly exactly with the case which

came under my notice convinced me that what I had to deal with was a case of acute eczema, and I have reported this, together with the remarks of Wooldridge (in horses), Mégnin and Mouroux.

It may, as Wooldridge states, be due to tropho-neurosis, and in this case tropho-neurosis of the lumbar plexus.

On the other hand it may, from its sharp onset be due to digestive disturbance, which incidentally may be easily argued back to tropho-neurosis, and in all probability rightly so.

News

National Dog Week and the Royal Veterinary College.

LAST year saw the initiation of two ideas, a National Dog Week and a Tail-Waggers Club, each instituted to help that friend and companion of man, the dog ; by educating his owner how to feed and otherwise treat him hygienically, and thus make his life happier and better.

Each idea emanated originally from the fertile brain of Capt. Hobbs, a well-known dog lover, who gathered around himself a few energetic friends and formed the National Dog Week Scheme with the Right Hon. the Earl of Chesterfield, K.G., as President, and Professor Hobday, C.M.G., F.R.C.V.S., the Principal of the Royal Veterinary College, as Chairman of the Executive Council. The Vice-Presidents include such well-known names as :—The Most Hon. The Marquis and Marchioness of Exeter ; The Most Hon. The Marchioness of Winchester ; The Rt. Hon. The Earl of Airlie, M.C. ; The Rt. Hon. Lord Daresbury, C.V.O. ; The Rt. Hon. Lord Harlech, C.B., T.D. ; The Rt. Hon. Lord Mildmay of Flete ; The Rt. Hon. Lorna Countess Howe ; Lady Harlech, J.P. ; Lady Seaforth, C.B.E. ; The Hon. Lady Ravensdale ; The Hon. Lady Burton ; Lady Kathleen Pilkington ; Maj.-Gen. Sir John Moore, K.C.M.G., C.B., F.R.C.V.S. ; Sir Archibald Weigall, K.C.M.G. ; Brigadier-General Malcolm O. Little, C.B.E. ; Lt.-Col. The Hon. S. Pleydell-Bouverie, D.S.O., T.D., O.B.E. ; Lt.-Col. E. W. Stanyforth, C.B. ; Lt.-Col. Sir Merrik R. Burrell, Bart., C.B., C.B.E. ; Theo. Marples, Esq. (*Our Dogs*) ; Mrs. Phyllis Robson (*Dog World*) ; A. Croxton Smith, Esq., O.B.E. ; Lt.-Col. M. W. Douglas, C.S.I., C.I.E., *Secretary*, Our Dumb Friends League ; A. Cornish-Bowden, Esq., M.R.C.V.S. ; Mrs. Carlo Clarke and Mrs. F. Colman.

That both Schemes have been a success is shown by the fact that the second year's National Dog Week is now arranged for ; and between the dates of September 22nd and the 28th, thousands of willing helpers will be assisting the cause of the dog all over England in all

kinds of ways and by all kinds of schemes. Dog shows, lectures, and other means of propaganda in all places. Full information for these can be obtained from the Secretary (Capt. Hobbs), 37, Temple Chambers, Temple Avenue, London, E.C.4. and literature will gladly be sent on application.

To join the Tail-Waggers Club (which forms a very useful insurance for regaining a lost dog) the fee is only 2/-, and already there is a membership of over 130,000. Recently they have been recruiting at the rate of over 1,000 a day.

The money thus raised will be given each year to some deserving cause which helps animal welfare. As the result of last year's efforts some £10,000 was given towards the establishment and endowment of a Chair of Canine Medicine and Surgery in the Royal Veterinary College (for which the minimum sum of £20,000 is required) and this year the money collected will be devoted to the completion of this object. Truly a practical result for which the veterinary profession should feel grateful to Capt. Hobbs, the creator of these two ideas; and to the Earl of Chesterfield and his hardworking Council for the successful manner in which they have carried the schemes out.

Correspondence

The Editor, THE VETERINARY JOURNAL, London.

Foreign Bodies in the Abomasum, in Merino Sheep. (June Issue.)

DEAR SIR,—

With reference to my article "Foreign Bodies in the Abomasum in Merino Sheep," published in your Journal dated June, 1929, the lick contained large pieces of uncrushed sulphate of copper, not sulphate of iron; I regret my clerical error on this point.

I would like to state that inquiries made three or four months later showed that further cases did not arise after the lick was discontinued; indicating that the sulphate of copper was destroying the bacteria necessary for cellulose digestion, and so indirectly causing the formation of these bodies.

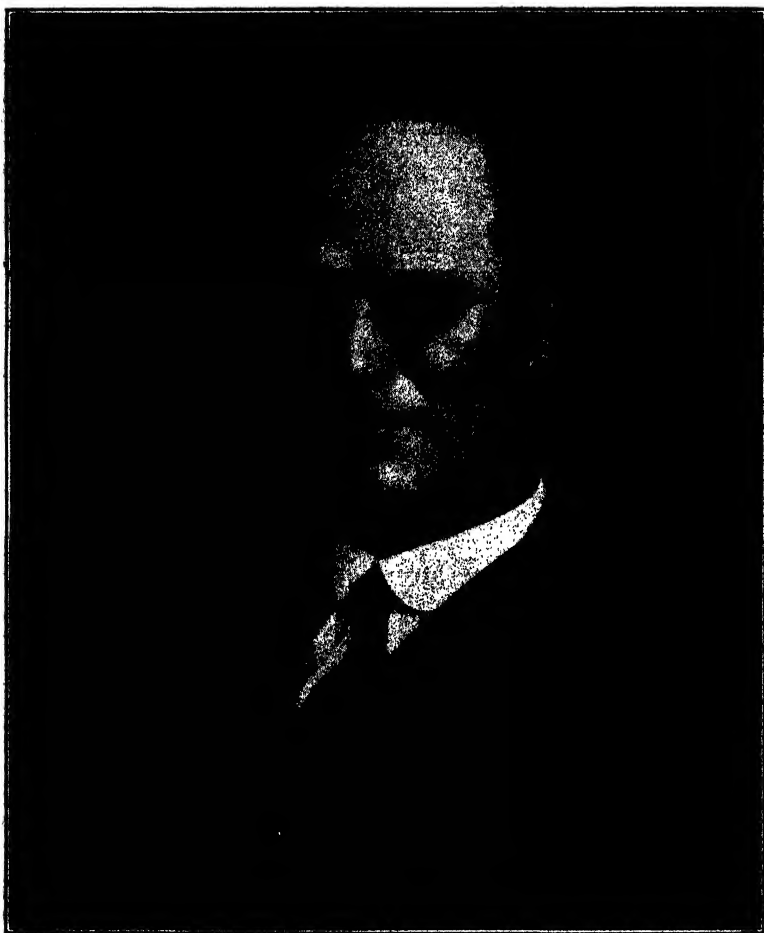
Yours faithfully,

R. PAINE, F.R.C.V.S.,

Veterinary Institute, Grahamstown, S. Africa.

Personal

Mr. G. B. SIMMINS, M.R.C.V.S., D.V.S.M., has been appointed Senior Veterinary Officer in Palestine.



PRINCIPAL J. CRAIG, M.A., M.R.C.V.S.,
President of the Royal College of Veterinary Surgeons.

THE VETERINARY JOURNAL

Editor :

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Sub-Editor :

GLADSTONE MAYALL, M.R.C.V.S.

OCTOBER, 1929.

Biography

PRINCIPAL J. CRAIG, M.A., M.R.C.V.S.

IN selecting Professor Craig to guide the destinies of the profession during the forthcoming year, the Council made a wise choice, for the settlement of the questions regarding the position of the members of the profession who practise in the Irish Free State has been for some time a somewhat curious one ; especially in regard to the payment of the Annual Registration fee to the governing body at Red Lion Square, and in certain other points of importance and mutual interest. It is well known that Professor Craig has worked very hard to bring matters to a satisfactory conclusion and there is a prospect now of this taking place.

After taking his B.A. at Glasgow University Professor Craig entered the Glasgow College as a veterinary student, passing his earlier examinations there and transferring to the London College in order to take the final ; being awarded the Diploma in 1902. Shortly after qualifying he applied for the Professorship of Anatomy in the Dublin Veterinary College, his candidature being accepted ; and after the death of Professor Mettam, Professor Craig was selected for the office of Principal, an office which he has filled worthily ever since. Elected to the Council of the Royal College of Veterinary Surgeons in 1919, Principal Craig has served on many Committees, and his election to the Presidentship has placed in charge of the ship of state a man whose opinion is always well thought out before being expressed, and who can be absolutely relied upon to carry out the onerous responsibilities and duties in a manner which will reflect credit upon himself and the profession.

Editorial

**THE PROPOSED "MEDICAL" DIRECTOR OF
THE "ANIMAL" DISEASES RESEARCH
ASSOCIATION.**

ALTHOUGH it may be said that there is no monopoly in regard to research into the diseases of animals yet it must be admitted beyond question that this comes primarily within the domain of the *veterinary* research worker ; as there is no better foundation for that than is obtained by the graduate in veterinary science. The information which was recently brought forward at the National Veterinary Congress at Ayr, that there was a proposal to put a *medical* man in charge of the laboratories and field work of the *Animal Diseases Research Association* struck the members present with astonishment, and seems almost ridiculous. In the hope of nullifying such an idea a resolution was unanimously passed against it, *stating emphatically that this was a post which ought to be occupied by a veterinarian.* The good work which Professors Gaiger and Pool have done on certain sheep diseases during the past few years is sufficient evidence of the value of the properly trained man being at the head of his own class of work ; and, in this instance especially, for the post of Director to be filled by a scientist who is a member of the veterinary profession.

What needs to be done is to persuade those in authority, and those who are on the selective board, that veterinary research is as important to the Agriculturist and Stockowner as is the work of the hospital laboratory worker to those who treat human diseases ; and that to be carried out effectively the laboratory worker must first acquire a thorough knowledge of the animals in health—otherwise how can he know them in disease ? No one has a better foundation of this kind than the student of veterinary science, and if after he has qualified he accepts a laboratory post he is all the better man for having previously been an efficiently trained student of animal hygiene. The laboratory at Moredun has been built and financed *for the express purpose of helping the farmer over the questions concerning the contagious diseases of animals* and the good work done already has proved the wisdom of the selection of its Veterinary Directors. The profession is, quite naturally, much perturbed at the suggested change in regard to the qualifications for its management. Let us hope that this point of view will receive very careful consideration. Moreover, it is a very great pity that the proportion of those holding veterinary qualifications on this Committee, which was formed for the express purpose of dealing with research into animal disease problems is in such a hopeless numerical minority.

General Articles

THE OPERATIVE TREATMENT OF TRAUMATIC INFLAMMATION OF THE NAVICULAR BURSA WITH PRESERVATION OF THE DEEP FLEXOR TENDON.*

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TRAUMATIC inflammation of the navicular bursa implies the inflammation resulting from the passage of a foreign body through the deep flexor tendon into or through the bursal cavity.

Before considering the several degrees of perforation with their complications and treatment, some remarks will be made on the physiology and the anatomical disposition of this region.

The distal sesamoid bone lies completely within the convex line described by the insertion of the deep flexor tendon into the third phalanx and its cartilages (see Fig. 1†). Because of this relationship the minimal frictional movement that occurs between the distal sesamoid bone and the deep flexor tendon cannot be due to the passage of tendon over bone, but results from the movement of bone upon tendon in the following manner: the articulation between the third phalanx and the distal sesamoid bone is such, that when weight is placed upon the limb the distal sesamoid bone moves slightly downwards and backwards producing a limited gliding movement between its posterior surface and the tendon.

The structure of the deep flexor tendon in the region of the distal sesamoid bone is quite complex. Generally speaking the tendon resolves itself into two symmetrical parts, each composed of spirally-disposed fibres which radiating to their insertion form a fan-like expansion. The surface of the tendon in immediate contact with the distal sesamoid bone is practically devoid of blood vessels. A few millimetres from the surface, isolated macroscopic vessels occur and these become more numerous towards the posterior face of the tendon related to the digital torus. The borders of the bursa are highly vascular.

Perforation of the navicular bursa may be simple or complicated by primary or secondary infection. In the case of perforation *without infection* the prognosis depends upon the extent and site of the injury. If the distal sesamoid bone is not involved healing will take place fairly readily particularly if the perforation be located in the vascular part of the bursal wall. If, as is usual, the bone is injured the so-called

* Translated by Geoffrey Brooke, B.Sc., M.R.C.V.S.

† The illustrations will appear at the conclusion of the article.

Traumatic Aseptic navicular bursal inflammation follows. In such a case spontaneous recovery will not occur unless there is only minimal injury to the cartilage overlying the sesamoid bone or the cartilage itself undergoes exfoliation (aseptic death). If neither of these conditions obtain the bone invariably becomes the seat of rarefying degenerative processes with secondary involvement of the bursa. Lameness in such cases may, after a time, be quite slight but so persistent as to demand either neurectomy or slaughter. The author has observed such cases in which two years after the original injury, healing of the bursa has still been incomplete.

The sequelæ of perforation with infection depend upon three factors. Firstly the type of invading organism; secondly the extent to which pus can gain exit from the part, and thirdly the implication of certain related structures.

Infection with the common pus-forming organisms can lead to either an acute or sub-acute condition. In the acute type considerable inflammatory change results; within ten days tissue break-down occurs in the substance of the tendon leading to partial or complete rupture and simultaneously the cartilage over the flexor face of the sesamoid bone is exfoliated; osteo-myelitis then develops in the bone with possibly secondary fracture. In the sub-acute form tissue destruction is proportionately slower. Exfoliation of the cartilage takes place less rapidly so that when an operation is performed it is revealed only partially destroyed. Healing in such a case may supervene if the cartilage ultimately undergoes complete destruction to permit of the obliteration of the bursa by granulations arising from the bursa boundaries and from the denuded bony surface.

If *Bacillus necrophorus* shares in the infection focal necrosis of the tendon supervenes. The process varies in extent and the affected areas show the characteristic yellow-green colour and soft consistency. *B. necrophorus* appears to have a geographical incidence. In Stockholm it is rare to find a quittor resulting from an infected "corn." In other areas in Sweden this is not uncommon. Some authors such as Nocard, Eberlein, etc., mention tendon necrosis as the regular sequel to perforation. When contrasted with conditions obtaining in and around Stockholm, such a statement would seem to point to a more regular infection by *B. necrophorus* in districts known by these writers. Other complications depend on the implication of certain structures related to the bursa. Infection may reach the distal inter-phalangeal joint by a direct anatomical communication; the articulation may be similarly infected if the foreign body perforate the phalango-sesamoid ligament. Involvement of the digital sheath or of the distal interphalangeal joint can result from a spreading of the inflammatory

process upwards from the proximal border of the bursa. Abscesses near the coronary margin or within the digital cushion can also occur together with quittor.

Treatment.

The treatment of purulent bursitis has varied at different periods. In early times caustics either in the liquid or solid form were forced into the perforating tract to induce sloughing of its walls but the results were not satisfactory. At the commencement of the nineteenth century Dietrichs and others introduced partial resection of the deep tendon but without gaining much support for the operation. In 1853 a Belgian Veterinary Surgeon, André, described the operation of total resection of the deep flexor tendon (Note :—in some works André appears to have been referred to as "De Fleuris," which is actually the name of his town of residence). André reports five cases. One died from Tetanus, cases 1, 2 and 3, showed no lameness after seven, two and four months respectively. In case No. 4, lameness was absent after one month. The same author reports favourable results following the operation on cattle. André's work appears to have been forgotten at this time. In 1879 Nocard recommended an operation similar to that of André whose writings were now revived. A number of articles then appeared recording the experience of several veterinary surgeons with the various operations.

The precise technique of the operations differed. André and Nocard removed the anterior part of the digital cushion to expose the deep tendon, which was resected from the level of the posterior border of the distal sesamoid bone forward to its insertion. Nocard used a curved incision when sectioning the tendon ; the curve was convex backwards and thus the outer fibres of insertion of the tendon were preserved intact. All the cartilage was curetted away from the surface of the sesamoid bone. These authors emphasised the importance of also curetting away the small fringe of tendon tissue remaining attached to the bone after resection. Nocard went further in that he curetted the bony surface of the semilunar crest, thus exposing the more porous subjacent osseous tissue which he presumed granulated more readily. Curettage of the tendon insertion appears to have been discarded. More of the frog has been removed by other operators. In some cases two-thirds and in others nearly the whole of it. Moller and Vennerholm reflect the anterior two thirds of the frog and, having operated on the tendon, replace the part.

The results of these operations differed widely. André and Nocard had strikingly good results. Nocard's first three cases returned to work free from lameness in six weeks after operation ! Merillat, on the contrary, asserts that after tendon resection patients are never

absolutely free from lameness. Vennerholm is also sceptical as to the final results. He considers that the fibrous tissue which replaces the defect in the tendon is never so strong as the original tissue and that ruptures occur in its substance, resulting in lameness. Recovered cases are therefore most suitable for slow agricultural work. Many authors recognise that the best results are obtained in draught animals but cases are on record of successful recovery in light horses. Thus Schmidt cites a case of a racehorse which was able to race within a year of the operation. Morkeberg also reports a successful operation on a thoroughbred animal. The number of authors mentioning neurectomy as a "dernier r  sort" to restore the subject to usefulness bear witness to the fact that in many cases the operation has not yielded good results.

In the face of these results it is questionable if such a radical procedure as total resection is justified. The author believes it is not justified. After total resection in addition to obliteration of the bursa considerable repair to the tendon must be effected. Is it not possible to secure a healing of the bursa with less injury to the tendon? As has been emphasised the tendon in this region has a complex structure in conformity with the special function it is called upon to play; it is, therefore, essential to preserve its integrity, at the same time removing necrotic portions wherever located. Most authors have advised against partial resection because of the less satisfactory results obtained. The reason for this lay in the fact that such an operation did not produce the necessary conditions for healing. The cartilage may be exfoliated either by the action of a purulent inflammation or by curetting at the time of operation. In the majority of cases of partial resection the half exposed sesamoid bone could not be completely curetted, and since the drainage established by the operation released the pus the residual cartilage remained attached to prevent subsequent healing.

The author has evolved an operation which over a considerable number of cases has given satisfactory results and enabled the patients to return to work. The objects of the method are fourfold, viz. :—

1. To resect all necrotic parts of the tendon.
2. To effect good drainage.
3. To remove all cartilage from the flexor surface of the sesamoid bone.
4. To inflict a minimum of injury upon the deep flexor tendon.

Technique.

The bars, frog and related parts of the sole are well pared down. A groove is cut in the sole; this starts from the angle between the wall

and the bar of one side, reaches forward to pass immediately anterior to the point of the frog and returns to a corresponding point on the other side of the foot. It is excavated with a hoof knife and should reach the summits of the subjacent vascular papillæ. With an ordinary scalpel the horny tissue around the inner border of the groove is separated from the underlying matrix. Care must be taken to avoid injury to the latter by keeping the knife edge close to the horny layer. With the help of a specially constructed instrument, the sole is now elevated in the region of the point of the frog, grasped with pincers and reflected backwards from the frog, its collateral sulci and the bars. The perforating tract is enlarged with a knife and a probe inserted to estimate the condition of the tendon in the vicinity of the puncture. A mid-line incision is now carried through the frog corium and digital torus extending from the point of the frog in front to the level of the prominences of the heel behind and reaching down to the posterior face of the tendon. With a finger introduced into the incision the borders of the distal sesamoid bone are palpated through the thickness of the tendon and with the knife point the tendon is perforated immediately over the middle of the bone. A button scalpel (blunt bistoury) is inserted through this opening and the tendon incised in the mid-line forward as far as its insertion and backwards to the level of the posterior borders of the sesamoid bone. Such an incision, while extending backwards sufficiently to drain the posterior reaches of the bursa should never open into the tissue posterior to this : otherwise infection may implicate the digital sheath or the distal interphalangeal joint. At this juncture the tendon is carefully examined. If one suspects a necrotic focus around the traumatic perforation the latter is exposed by incision of a minimum amount of fleshy frog. Necrotic areas are removed and if only a narrow strip of tendon tissue remains between the incised area and the original mid-line incision the strip should be resected. The integrity of the digital torus should be preserved as far as possible. This, lying in contact with the posterior face of the tendon is intimately concerned in the blood supply of the latter (*vide supra*). The sesamoid bone is now examined. Sometimes the flexor surface is found intact with the cartilage normal. In other cases the latter is completely exfoliated and the exploratory probe encounters exposed bone over the whole surface. If cartilage is present it is removed with a special curette (Fig. 5). An assistant grasps the toe and flexes the distal interphalangeal joint ; in this position the curette is inserted into the bursal cavity first to the one side and then to the other. By forward, backward and lateral movements of the instrument the cartilage is readily removed and though some small islands remain these exfoliate later. Some curettes are made to work in one direction only, and in such a case

after completing a stroke the instrument is brought back to the starting point by lifting it from the bony surface and slipping its blunt face along the tendon. The underlying bony surface may suffer a little, but this appears to have no detrimental effect. In this connection one may recall that Nocard in his "total resection" operation practised curettage of the superficial dense bone to expose the more porous osseous tissue and obtain better granulation.

The bursa is now thoroughly irrigated; a curved canula is inserted and the cavity flushed first with hydrogen peroxide solution and finally with strong tincture of iodine (B.P.). A gauze drain is inserted through the incised tendon; to counteract the bleeding commonly succeeding hoof operations, the super-imposed wool dressings are soaked in hydrogen peroxide solution. The part is bandaged in the usual way and covered with sacking. The latter can be changed as soon as advisable. If practicable the bandages should be left in position for several days though soaked with blood; infection can be prevented by drying the bandage in position with the "Hot Air Apparatus."

After treatment. When healing is nearly accomplished, the foot is shod with a protective sole, metal or leather. The former is the better as it is more easily removed. The shoe should bear caulkins one inch or a little more in height. The toe should be pared down and kept short. If it is allowed to grow long it causes tension upon the cicatrix and the animal will go lame.

In a few cases dealt with by the writer the operation was modified. The incision through the fleshy frog was so disposed as to pass through the perforating tract. When the sesamoid bone was exposed with a corresponding incision through the tendon it was found difficult to curette the further half of its surface. A mid-line incision is also preferable in that it passes through that part of the tendon least concerned in bearing weight, i.e. the centrally placed groove depicted in Fig. 2. In two cases a caustic solution (10 per cent. Arsenious Acid) was used to remove the cartilage.

The progress of the patients after operation varies. The animal is always very lame during the first few days, but gradual improvement is seen until at the end of several weeks weight is being borne by the affected limb. In some cases the acute lameness lasts longer, two or three weeks elapsing before the leg is used at all. In the average case a shoe can be put on after six weeks. In three months the subject can do light work whilst after six months fast work can be accomplished without lameness.

Some cases exhibit complications of so serious a nature that destruction is advisable, as, for example, in cases of extensive necrosis and

ultimate rupture of the tendon, infection of the distal interphalangeal joint, the digital sheath or rupture of the collateral sesamoidean ligaments.

It is obvious that with an infected perforation of the navicular bursa a better prognosis can be given if this operation is performed early. The longer the infection is allowed to invade the tissues the less will be their power of recovery. It is essential therefore to determine if infection is present, and just as it is necessary to treat the fresh case of "nail tread" conservatively, so is it essential to proceed immediately to operation once infected perforation is diagnosed. By exposure of the nail tract (and cautious use of the probe finally) one can usually determine if the lameness is due to injury to the digital cushion, an abscess on the posterior face of the tendon or involvement of the bursa. If the latter, postponement of operative interference is only justified where there is very slight infection or where the exact nature of the injury remains undetermined.

(To be continued.)

BACILLUS ŒDEMATIENS INFECTION IN CATTLE.

By T. J. BOSWORTH, B.Sc., M.R.C.V.S., D.V.S.M., and
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THE investigation of a recent outbreak of disease in a herd of young cattle has led to the conclusion that the deaths which occurred were attributable to infection by *B. œdematiens* (*B. novyi*). Although occasional references to this organism as a cause of disease in animals have from time to time appeared in the literature it is only within recent years, as the result of a number of observations in various parts of the world, that its importance in veterinary pathology has become definitely established. A brief summary of the available publications dealing with this subject will suffice to illustrate its significance.

As long ago as 1894 Kerry isolated from the muscle of a cow believed to have died of blackleg an organism resembling Novy's *B. œdematis maligni* II (*B. novyi*). Von Hibler (1908) reported a case of infection in a wild hog due to *B. novyi*. The lesions present resembled those of Rauschbrand. Diedrichs (1911) recorded the death of two horses as the result of anærobic infection. The cultures obtained from these cases were apparently impure but one of them after several animal passages produced in the guinea pig an abundant colourless subcutaneous œdema thus resembling *B. œdematiens*. Weinberg and Séguin (1917)

described a case in which a mule that was being used for the production of antivenin developed an infection due to *B. œdematiens* and *B. histolyticus*. The animal recovered following the administration of several doses of mixed serum. Heller (1920) isolated *B. œdematiens* from three horses that died whilst they were subject to an immunity experiment and Hall described a strain of this anaërobe recovered from a fatal case of wound infection in the same species. Mejlbo (1925) isolated the organism from a case of gas gangrene in a pig whilst Zanolli and Catino found it associated with *B. histolyticus* and another organism in the case of a horse that developed an infection whilst undergoing hyperimmunisation.

The outbreaks recorded up to this time, however, had involved but a limited number of animals and it was not until 1927 when Turner and Davesne identified as *B. œdematiens* the organism isolated by Albiston from a number of cases of "black disease" of sheep in Australia that the extent of the losses among livestock which may under certain conditions be caused by this anaërobe came to be fully realised. In a later publication, in which he records a case of this disease in a cow, Turner mentions a private communication from the German investigator Zeissler to the effect that a condition which he has described as "*die infektiöse Lebernekrose der Schafe*" appears to be identical with "black disease" as seen in Australia.

In this country McEwen (1927) isolated *B. œdematiens* in pure culture from the muscle of a bovine animal that was thought to have died of blackleg. Scott in America (1928) gives the following record of the isolation of seven strains of this organism from blackleg cultures or material obtained from cases of blackleg :—

"The first strain was obtained in connection with *C. welchii* in a case of clinical blackleg. A second strain from dried sheep muscle which also contained *C. tertius* and *C. sporogenes*. Two samples of dried muscle virus sent to this laboratory as blackleg virus contained *C. novyi* only. The fifth strain was obtained from an atypical *C. chauvæi* culture. The sixth strain was isolated from a case of clinical blackleg. A study of a recent outbreak of blackleg-like disease in a flock of lambs revealed the presence of *C. novyi* in these cases," Weinberg and Milhaiesco (1928) reported the presence of *B. œdematiens* in six samples of blackleg material examined by them. Three of these were from sheep in Australia, two from cattle in Germany and one from an ox in the Ukraine. Zeissler (1928) has also recorded the isolation of this organism from several cases of blackleg.

It is of interest to note the result of this author's examination of two cultures which had been considered to be those of a very toxigenic variety of the blackleg bacillus. The strains in question, both isolated

from cases in cattle (one by Ivanic and the other by Kojima) proved to be *B. œdematiens*. Therein lies a possible explanation of the true nature of some other strains of so-called *B. chauvæi* which have been described as producing a soluble toxin.

The outbreak which forms the subject of this article occurred in West Norfolk in the practice of M. Bray, Esq., M.R.C.V.S., of Docking, to whom we are indebted for supplying material for examination together with an account of the history, symptoms, and *post-mortem* appearances of the affected animals. The disease broke out early in February last in two groups of young cattle numbering one hundred and eighty respectively. These animals, which were about eight months old, were the property of one owner who had purchased them in Lincolnshire some six months previously. The two groups were kept separately on adjoining farms being allowed out to grass in the daytime and brought into yards at night and during rough weather. The district is one in which cases of true blackleg are quite uncommon, but to Mr. Bray's knowledge occasional deaths among cattle have from time to time occurred on these particular farms in which the symptoms shown were similar to those observed in this outbreak. These consisted of high temperature, loss of appetite, and marked stiffness of gait particularly of the hind limbs. The animals were disinclined to stand, and when forced to do so showed signs of dyspnoea and distress. In the later stages they were unable to rise. Their condition rapidly became worse, and death took place within twenty-four to forty-eight hours of the onset of symptoms. The total number of animals affected was thirteen all of which died.

Lesions.

On *post-mortem* examination the most striking feature observed was the presence of a thick layer of yellowish transparent gelatinous exudate in the subcutaneous tissue of the abdomen and of the inside of the thighs extending in some cases to the axillary region. Some of the muscles appeared to be abnormal, particularly the biceps femoris, semitendinosus, semimembranosus and psoas. These were soft and œdematous but were not broken down or dark in colour as is the case with blackleg muscle. Little or no gas was present except in one animal which fractured a leg after the onset of symptoms. In this case the limb became very emphysematous before death. No abnormalities were noted in the internal organs apart from some excess of fluid in the serous cavities and a possible slight enlargement of the spleen.

Bacteriological Examination.

The material received for investigation consisted of portions of muscle and spleen together with swabs of the subcutaneous exudate.

This was found to contain an organism that proved to belong to the *oedematiens* group. It was present in large numbers in smear preparations. Direct cultures were obtained in liver broth, meat broth and on serum agar. The organism was also recovered from the heart blood of guinea pigs that were inoculated with an emulsion of the material. The latter cultures were found to be pure, but those made direct were presumably contaminated from the outset by *B. sporogenes* although the presence of this organism was not suspected until the tubes had been left standing for some days at room temperature. There was no difficulty, however, in obtaining a pure culture of *B. oedematiens* by transplanting single colonies from the agar plates.

Characters of the Organism.

Morphology.

A rather large bacillus with rounded ends of an average width of $1\ \mu$ and varying in length from $3-8\ \mu$. The individual forms may be straight or curved. The organism occurs singly or in short chains of two or three elements. Spore formation takes place both in the animal body and in artificial media. The spores are oval, subterminal and do not greatly distend the bacillus.

Staining Reactions.

In young cultures the organism is uniformly stained by the ordinary dyes and is Gram positive. Older cultures show a number of elements that are unevenly stained and some which are Gram negative.

Motility.

In ordinary hanging drop preparations the bacillus is not obviously motile but in stained smears the presence of numerous peritrichous flagella can be demonstrated. In this respect therefore it conforms to the description given by most authors of organisms of this group.

Cultural Characters.

Strictly anærobic conditions are necessary for growth. When freshly isolated the organism did not grow at all luxuriantly in any medium except liver broth, and it was only after it had been sub-cultivated for some time that satisfactory growths were obtained in many of the ordinary media. Even now it still fails to grow in deep glucose agar. Somewhat similar experiences have been noted by Weinberg and Séguin and by Turner and Davesne.

In liver broth growth is very rapid and abundant producing uniform turbidity with the evolution of a large quantity of gas. Many

spores are present after 24 hours. Later, the growth sediments quickly forming a large amount of deposit at the bottom of the tube, and leaving the supernatant fluid quite clear. This tendency to flocculation occurred in all liquid cultures, and we were unable to detect any evidence of variation similar to that described by McEwen who found that a strain of the organism which he isolated direct from bovine muscle showed no evidence of flocculation, thus differing from that recovered from inoculated guinea pigs. McEwen suggested that the passage of *B. œdematians* through a bovine may possibly have accounted for the suppression of a normal character of the organism namely flocculation, but this variation is evidently not the constant result of such passage. In the ordinary meat broth the growth is not so abundant as in liver broth. The medium first becomes slightly turbid and a few bubbles of gas are produced. Numerous spores are present after eighteen hours' incubation. The meat appears to undergo but little change, and when the growth has sedimented it is hardly possible, by the naked eye, to distinguish such a culture from an uninoculated tube of this medium. In Robertson's cooked meat medium, however, the growth is much more abundant. The organism grows well in brain broth with evolutions of gas. Only slight blackening of an iron nail is produced. Growth is very scanty in ordinary broth, but is more abundant in the presence of glucose or serum, especially the latter. In deep serum glucose agar cultures the colonies are at first dense and lenticular. Later, their edges become fluffy and finally they appear loose and filamentous in texture, resembling the so-called snowflakes. The medium becomes split by gas. On the surface of serum agar small dewdrop-like colonies are formed which are either circular or irregular in outline and tend to spread and become flat with continued incubation. A similar growth takes place on blood agar, but there is no evidence of hæmolysis on this medium. Slight hæmolysis, however, occurs in cultures in blood broth. The organism does not liquefy solid serum or Dorset's egg. On Petroff's medium the surface layer becomes decolorised. Gelatin to which 2 per cent. glucose has been added becomes liquefied after three to five days' incubation. In plain gelatin no growth occurs. The organism grows slowly in litmus milk producing slight acidity but no coagulation.

Action on Carbohydrates.

Glucose, levulose and maltose are fermented with the formation of acid and gas. Saccharose, lactose, mannite, dulcitol, glycerin and inulin remain unchanged.

Pathogenicity.

The organism sets up a fatal infection when injected into guinea

pigs, rabbits and mice. Its effect on the large animals has not been tested. When freshly isolated the subcutaneous or intramuscular injection of 0.1 c.c. of liver broth culture killed guinea pigs in 18 hours, whilst a dose of 0.05 c.c. was fatal in 36-48 hours. The virulence of the strain remained fairly constant in artificial culture for the first few months, but has since declined to such an extent that doses of culture less than 2 c.c. are no longer fatal to the guinea pig.

Lesions in Experimental Animals.

There is extensive oedema of the subcutaneous tissue of the abdominal wall spreading forward to the axillary region and in some cases to the intermaxillary space. This exudate which is gelatinous and hæmorrhagic in appearance, contains throughout a large number of organisms some of which show evidence of sporulation. A few small bubbles of gas are also present. The odour is faintly rancid, but not putrid. Following subcutaneous administration the muscles show no change in appearance, but they become distinctly hæmorrhagic at the site of inoculation after intramuscular injection. The serous cavities may or may not contain a slight excess of clear fluid, which may be quite abundant in the pericardial sac in the rabbit. The internal organs may show slight congestion, but this again is variable, and never very well marked. The organism is present on the peritoneal surface of the liver occurring singly or in pairs, but not in the form of filaments. It is constantly present in the heart blood even in animals killed for examination some few hours before death would otherwise have taken place.

Toxin.

Repeated attempts to obtain a toxin by growing the organism in various media have proved unsuccessful. In every case the culture filtrate has failed to produce any harmful effect when injected into mice in doses up to 0.5 c.c.

Experiments with B. *œdematiens* Antiserum.

The administration of B. *œdematiens* antiserum affords complete protection to guinea pigs from the pathogenic effects of this organism even when inoculated in quantities several times greater than the minimum lethal dose for control animals. We are much indebted to Dr. R. A. O'Brien of the Wellcome Physiological Research Laboratories for his kindness in providing us with a supply of this serum.

Discussion.

In its morphological and cultural characters the organism resembles B. *œdematiens* in all essential points. It differs, however, from the majority of strains of that organism in that it appears to be com-

pletely non-toxicogenic. Moreover, it is invariably septicæmic in experimental animals in which it produces a deeply hæmorrhagic subcutaneous œdema. Weinberg and Séguin describe two types of *B. œdematiens*—the “toxicogenic” and the “virulent.” The former tends to remain localised at the point of injection in experimental animals and gives rise to a colourless œdema while the latter shows invasive tendencies and is septicæmic. The organism described by Turner and Davesne was originally of the “toxicogenic” type but after a series of passages in deep agar it changed to the “virulent” form and at the same time lost much of its power of elaborating toxin. It would appear that the organism described in this article represents an extreme case of the “virulent” as opposed to the “toxicogenic” type of *B. œdematiens*.

REFERENCES TO LITERATURE.

- KERRY.—Ueber einem neuen pathogenen Bacillus. Centralblatt f. Bact. 1894. 16. p. 372.
- VON HIBLER.—Untersuch. u. d. pathog. Anaeroben. Jena 1908.
- DIEDRICHS.—Zur Rauschbrandfrage beim Pferde. Deutsch. tierartl. Wchnschr. 1911. 19. p. 97.
- WEINBERG ET SÉGUIN.—La Gangrene gazeuse. Paris, 1918.
- HELLER.—Etiology of Acute Gangrenous Infections of Animals. Jl. Inf. Dis. 1920. 27. p. 385.
- HALL.—Differentiation and Classification of Sporulating Anærobes. Jl. Inf. Dis. 1922. 30. p. 445.
- MEJLBO.—Ein fall von Spontaner Infektion mit Novys Bazillus (*Bac. œdematiens*, Weinberg et Séguin) bei einem Schwein. Centralbl. f. Bact. 1925. 95. p. 339.
- ZANOLLI ET CATINO.—Flore Anærobie des Chevaux. C. R. de la Soc. de Biol. 1925. 92. p. 817.
- TURNER ET DAVESNE.—Role du *B. œdematiens* dans l'Etiologie de l'Hepatitis Infectieuse Necrosante (Braxy) du Mouton Australien Annales de l'Inst. Past. 1927. 41. p. 1078.
- TURNER.—Infectious Necrotic Enteritis (Black Disease) caused by *B. œdematiens* in a Cow. Australian. Vet. Jl. 1929. 5. p. 11.
- McEWEN.—Variation shown by *B. œdematiens* isolated from a Bovine Animal. Jl. Comp. Path and Therap. 1927. 40. p. 281.
- SCOTT.—The Etiology of Blackleg and Methods of Differentiating *Clostridium Chauvœi* from other Anærobic Organisms found in Cases of Blackleg. Cornell. Vet. 1928. 18. p. 259.
- WEINBERG ET MIHAILESCO.—*B. œdematiens* et Charbon symptomatique. C. R. de la Soc. de Biol. 1928. 99. p. 1709.
- ZEISSLER.—Kolle u Wasserman. Handbuch d. path. Mikroorg. 1928. Bd. 4. p. 1117.
- MEDICAL RESEARCH COMMITTEE.—Special Report Series No. 39. Report of the Committee upon Anærobic Bacteria and Infections.

IMMUNISATION OF HOGGS* AGAINST BRAXY

By W. LYLE STEWART, M.R.C.V.S.,

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(In collaboration with the Veterinary Laboratory of the Wellcome Physiological Research Laboratories.)

NIELSEN (1) in 1888 described a bacillus associated with Bradsot, and eight years later this work was confirmed by Jensen (2) who studied the bacteriology of Bradsot on material sent from Iceland and the Faroe Islands. Jensen also showed that sheep can be actively immunised against the disease by use of a special antigen. In 1922 Gaiger (3), working in Scotland on Braxy of young sheep, isolated *Vibrio septique* from affected animals, and his work indicated that Braxy in sheep in Scotland is identical with the Bradsot of Iceland. He also showed that the disease can be prevented in sheep by the injection of the toxin of *Vibrio septique*. Allen and Bosworth (4) carried out experiments from which it can be concluded that, using 50 per cent. under-neutralised mixture of *Vibrio septique* toxin and antitoxin as an antigen, active immunity can be produced in sheep, and that they will withstand a fatal dose of *Vibrio septique* culture.

Bosworth (3) carried out field experiments with the above mixture with the following result. Of 1,480 hogs inoculated on twenty-two farms, 31 or 2.09 per cent. died from Braxy, while of 1,696 uninoculated hogs on the same farms, 120 or 7.70 per cent. died. Dalling, Allen and Mason (6) record the result of a field experiment in which a similar antigen was used in sheep: 549 sheep on seven farms were inoculated. Of these 2 or .37 per cent. died from Braxy, while of 464 sheep on the same farms, but receiving no inoculation of antigen, 72 or 15.5 per cent. died. The same authors (7) carried out a further test the results of which are that "the use of vaccine . . . reduced the mortality in hogs from 6.8 per cent. among 1,457 unvaccinated sheep to 2.2 per cent. among 4,010 vaccinated." For the past two seasons we have carried out field experiments in which a modified *Vibrio septique* antigen—Anaculture (or toxoided whole culture)—was used. The material was made, tested and standardised by the Veterinary department at the Wellcome Physiological Research Laboratories.

In season 1927-28 the experiment consisted in inoculating about an equal number of hogs on five farms with the usual 50 per cent. under-neutralised toxin antitoxin mixture, and with Anaculture (toxoided whole culture). Hogs treated with T.A.M. received two inoculations

* Young sheep of both sexes are known as hogs during their first winter of life.

—a fortnight elapsing between them. On two farms two doses of Anaculture were injected at the above interval, while on the other three farms one dose only of Anaculture was used. The results of the experiment are detailed in Table I.

Table I.

Farm	<i>Toxin antitoxin mixture</i>			Anaculture. (<i>Toxoided whole culture</i>)		
	Hoggs inoculated	Died Braxy	%	Hoggs inoculated	Died Braxy	%
1	67	2	3	69*	0	0
2	57	0	0	57	0	0
3	94	1	1.06	91	1	1
4	110	1	0.9	116*	0	0
5	39	2	5.0	39*	0	0
Totals	367	6	1.6	372	1	0.3

* Only one dose given.

It is unfortunate that control uninoculated hogs were not kept on these farms. All that can be deduced from the experiment is that, in the light of past years' experience which showed that Vibrion septicum toxin antitoxin is a good antigen for immunising hogs against Braxy, Anaculture may be an equally efficient immunising agent. Moreover, one dose may be sufficient to prevent naturally occurring Braxy.

In 1928-29 further experiments were undertaken to show whether the single Anaculture inoculation method would prove efficient in the prevention of Braxy. The farms chosen were places where the disease is enzootic, and most of the flockmasters had previous experience of the T.A.M. inoculation method. The experiment was spread over twelve farms and approximately 75 per cent. of the hogs were inoculated, and the remaining 25 per cent. received no treatment and therefore served as controls. Table II shows the result of the experiment in which 1,222 hogs were inoculated once only with Vibrion septicum Anaculture, while 456 animals on the same farms were left as controls. Of the former 17 or 1.4 per cent. died from Braxy, and from the controls 43 or 9.4 per cent. died. The result of the experiment indicates that one dose of Anaculture may be sufficient to protect hogs against naturally occurring Braxy.

Table II.

Farms	Hoggs inoculated with Toxoid.	Deaths from Braxy	%	Control Hoggs Uninoculated.	Deaths from Braxy.	%
1	138	3	2.17	46	4	8.7
2	126	2	1.60	42	3	7.14
3	60	0	0	20	1	5.0
4	95	2	2.10	13	0	0
5	117	1	.85	20	1	5.0
6	78	1	1.30	45	5	11.1
7	152	2	1.31	59	6	10.53
8	112	2	1.78	37	6	16.2
9	123	1	.81	40	3	7.5
10	125	0	0	41	2	5.0
11	56	1	1.78	55	10	18.0
12	40	2	5.00	40	2	5.0
12	1222	17	1.4%	456	43	9.4%

It is hoped to arrange a further series of experiments within the next few months and to publish the results with a discussion of our ideas on the possible reason for the efficacy of the single dose Vibron septique Anaculture method of inoculating against Braxy in hoggs.

Summary and Conclusion.

A single dose of Vibron septique Anaculture (toxoided whole culture) appears to protect hoggs against Braxy in the field.

REFERENCES.

- (1) Nielsen, *Tidsskrift for Veterinærer*, 1888.
- (2) Jensen, *Deutsche Zeitsche*, f. Tiermed, 1896.
- (3) Gaiger, S. H., *Journal of Comp. Path. & Ther.*, 1922.
- (4) Allen & Bosworth, *Veterinary Journal*, 1924, Sept.
- (5) Bosworth, T. J., *Veterinary Record*, 1929, Aug. 8th.
- (6) Dalling, Allen & Mason, *Veterinary Record*, 1925, July 11th.
- (7) Dalling, Mason & Allen, *Veterinary Journal*, 1926, Vol. 82, No. 6.

MEMORANDUM* ON THE REPORT OF THE COMMITTEE APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES.

By R. MAGREGOR, M.R.C.V.S.,

Government Veterinary Surgeon, Malay States.

1. THE Report of the Lovat Committee to inquire into the Colonial Veterinary Services has apparently received well merited

* Passed unanimously at the July Meeting (1929) of the Far Eastern Veterinary Medical Association.

approval from all quarters concerned, and we earnestly hope that the recommendations contained therein will be put into action early.

2. There is, however, one paragraph which, in our opinion, is a trifle misleading. Para. 81, Part VII, states :

“ As regards salaries, we consider that the initial salary of £600 per annum is adequate and compared favourably with that paid in other scientific departments. In our opinion salaries obtained during his passage through a ‘ long scale ’ (such as those in existence in the Tropical African Colonies and in Malaya) are sufficiently remunerative for an officer of average ability.”

3. According to the report no evidence was taken from Malaya, but the facts are these.

A Veterinary Surgeon's initial salary is £560 with a 10 per cent. allowance that may cut off at any time, and in any case does not count for pension. In this initial salary he is on the same level as Agricultural Officers, Schoolmasters and Education Officers, Electrical Engineers, Forest Officers, Chemists and Pharmacists, Inspectors of Mines, Railways and Buildings, Post Office and P.W.D. Storekeepers and Accountants, Geologists, Town Planners and all Engineers.

4. Out of this list, the Geologists, the Chemists and the Civil Engineers alone can be considered as our scientific equals.

Dentists are considered equal to Medical Officers and have an initial salary of £700.

5. Each of the first five years of service, the Veterinary Surgeon's salary will rise by \$20 per month (£2 6s. 8d.) as compared with \$25 (£2 18s. 4d.) of all these other officers with the following results :

A. After one year of service all these officers will take precedence of the Veterinary Surgeon at Official functions. Should any shortage of houses occur, the needs of the Veterinary Surgeon will be considered last, and at any time he may be required to make room for one of these better paid officers.

B. After four years service each of these officers will be entitled to better quarters and better travelling allowances than the Veterinary Surgeon, and each of them will have reached the initial salary of a doctor or dentist, a salary that will not be given to the Veterinary Surgeon for five years.

C. After sixteen years service each will have reached his maximum salary, a point which the Veterinary Surgeon cannot attain until he has served seventeen years. Doctors and Dentists attain this in twelve years.

6. Now as an officer on retirement draws a pension calculated on his average salary for three years prior to retirement, it follows that Doctors can retire on full pension after fifteen years service, other officers after nineteen and Veterinary Surgeons after twenty at an age of no more than forty years ; the extra year in this climate being extremely trying and frequently destructive to the health.

Similarly, the widow and orphans of a Veterinary Surgeon who dies during service will receive a pension calculated at a lower rate than that of any other officer.

We therefore fail to see where the favourable comparison of salaries can be made.

7. We have already formally complained of the impossibility of a Veterinary Surgeon attaining any promotion or super scale appointments on account of the parsimony with which we are equipped and the discouragement we receive in our work, but, as this has been dealt with very ably and emphatically in the Report, nothing further may be added.

8. In conclusion, we would emphasise that salaries quoted in English pounds without further comments are extremely apt to mislead. The intending applicant for a post abroad should always endeavour to obtain information as to the salaries paid to his associates, for it is their salaries that rule the question of cost of living.

Clinical Articles

Tetanus in a Monkey Successfully Treated with Saturated Solution of Magnesium Sulphate.

By J. CHOWDHURY, G.B.V.C.,

State Veterinary Officer, Jaipur, India, Rajputana.

PATIENT :—A young Ceylon Monkey.

Some days back at feeding time, while the keeper was entering the cage, it escaped and was bitten by a dog.

One wound was pretty deep, others were only skin deep. It was a problem to dress the wounds as he would not allow handling, but after the first two days syringing and dry dressing he came to realise the situation and quietly submitted to the process, but the main difficulty of keeping the wound aseptic could not be overcome as he would not refrain from picking the part. The wound was having attention

once a day but just at this stage I had to go away for two days, and on my return there were distinct symptoms of tetanus.

The jaw was almost locked, so that he could only draw in liquid sustenance ; back fixed, hands had slight movement, he walked about like a stick, on hind legs, but could make no lateral movement ; his activity was confined to the floor of the cage, and he was unable to jump up to the perch. His motions very offensive and semi-solid.

Treatment was carried out on the lines recommended by Captain Dawson for horses. Saturated solution of magnesium sulphate $2\frac{1}{2}$ c.c. being injected twice daily. Having given six injections, two per day, I dropped to one injection and he is now jumping about like he used to do and is seen at all unapproachable places. He is like a child again at the sight of feed.

No anti-tetanic serum was injected.

Inquiry. Any suggestion as to the use and dosage of anti-tetanic serum in such subject will be welcome.

Abstracts

The Doppler Process in Veterinary Practice.

By PROFESSOR DR. A. ANTONINI,

Milan.

THIS process, well known in human surgery, where it seems so far to have given excellent results in various morbid conditions, and especially in those changes which come with old age, has been introduced by me into veterinary practice, but I am postponing the description of my results until after I have had the opportunity of testing it on the large scale which its importance seems to deserve. Meanwhile I will give an account of the operation itself in the interests of such colleagues as may wish to try it.

To begin with, let me state that the Doppler process depends on the action of certain substances on the perivascular fibres of the sympathetic and the inventor of the process has, after much experimenting, succeeded in obtaining a substance which he calls isophenal that, by counteracting the effects of the vaso-constrictor fibres, produces a permanent dilatation of the arteries, thereby allowing an increased flow of blood into the organ nourished by them.

The applications of the Doppler treatment are most varied, and in human surgery in Italy, Prof. Caneva-Zannini has extended its application with the very best results to the conservative surgery of the joints in very serious and "incurable" cases.

In veterinary surgery, though its field of application may be much more restricted, its use is indicated, e.g. in the case of certain torpid sores on the limbs of our animals. Without, however, for the moment risking a positive judgment, I feel sure that its most attractive and useful application is the treatment of the sex glands, both male and female, and my thanks are due to Dr. Doppler for making me the instrument of its introduction into veterinary practice, and putting me in touch with Prof. Caneva-Zannini for the appropriate instruction.

THE OPERATION. The actual operation is easy enough and in itself quite free from danger. It merely consists in exposing the main artery of the testis, scarifying the albuginea and generously painting these organs with isophenal. The animal is thrown on its left side as for castration. After careful disinfection of the field of operation, and local anæsthetizing, associated possibly with a light general anæsthesia, an incision of 12 to 15 cms. is made along the anterior margin of the spermatic cord, till the anterior margin of the testis is reached. Then, having exposed a large part of the funicle by an incision of the common sheath, the connective tissue surrounding the pampiniform plexus is carefully torn with the fingers, so that the artery can be easily felt through its thickness and is thus soon isolated for a stretch of some centimetres, indeed, as far as can be managed. As soon as this is done, the testis is taken out of the vaginal cavity, the albuginea is lightly scarified and the liquid painted on. The testis is then replaced in the vaginalis without suture, in order to avoid any possible compression along the cord. Then the skin is sewn up. It is to be carefully noted that, in order to avoid dilution of the liquid with blood, all hæmorrhage must be completely arrested in the field of operation before the painting is done. It is also well to paint the connective tissue investment of the whole funicular cord, as well as the lining of the vaginal cavity.

Dr. Doppler advises a bilateral operation, but I have confined it to one side so as to reduce the shock in animals of advanced age.

The procedure was first practised on an experimental dog, and the operation performed on two old horses that seemed to be beyond the age of fecundity, but otherwise in good condition.

The first horse was done on the 28th of February, and died of trauma 48 hours later, and the second, done on the 11th of March, left the clinic ten days later completely cicatrised, but with a rather voluminous scrotal œdema. Doppler regards the œdema as a reaction advantageous to the final success of the operation.

On the 28th of March, that is 17 days after operation, I received an urgent, and I think premature, message, from Colonel Vanzi, the owner of the horse, that it had been sent back to stud. What will be the result of this first operation time alone will show. According to Dr. Doppler

3 or 4 months are required to give recognisable primary effects, and 7 to 9 months to enable one to judge the final results. In our case the subject of operation has been sent back to work too early, but I shall certainly be furnished with news at the end of the mounting season. As, however, we are dealing with but a single case, no useful conclusions can be drawn, but it is certainly worth testing this new operative process in both ox and horse. I say nothing of operation on the female, not having attempted it, but it will be appreciated that to operate on the utero-ovarian artery is a different matter altogether. If any colleague wishes to try the experiment and wants further explanations, I shall be pleased to communicate with him. (*La Clinica Veterinaria*.)

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Seventy Years of Veterinary Service in the United States.

By PIERRE A. FISH,
Ithaca, N. Y.

INCIDENTAL to our work in assembling material for the "History of the Veterinary Profession in America," and as a part of the effort of the A. V. M. A. Committee on History, it has been our privilege to come into possession of some interesting details relating to the census reports of the profession.

The veterinarian is regarded as the unit of service and although the data relate to statistics, some illuminating conclusions may be drawn from them.

Our knowledge of veterinary service in the United States, prior to 1850, is very meagre and seems to be attainable only by search for occasional references in the early American agricultural periodicals and foreign veterinary journals. The first official record of the number of veterinarians in this country is given in the seventh U. S. Census Report, for the year 1850. It is believed that the census reports of this early period contained some inaccuracies but they represent the only official records now available.

According to the 1850 report, there was a total of 46 veterinarians, limited to eight states of the whole country, distributed as follows: New York, 20; Ohio, 8; Massachusetts, 5; Indiana, 5; Illinois, 4; Virginia, 2; Vermont, 1; District of Columbia, 1; Each decade has shown an increase and for the sake of conciseness, the figures are given in Table I.

Table I.—Census Figures on Veterinarians.

CENSUS	YEAR	VETERINARIANS	INCREASE %
7th	1850	46	
8th	1860	392	752.1
9th	1870	1166	197.4
10th	1880	2130	82.6
11th	1890	6494	205.0
12th	1900	8163	25.7
13th	1910	11652	42.7
14th	1920	13494	15.7

It may be noted from Table I that the percentage of increase in the number of veterinarians shows a very decided falling off after 1890. This date represents the line of cleavage between the lawless period, when practically no barriers existed to prevent anyone from practising as a veterinarian, and the legal period when educational standards began to be required and a number of the states enacted laws regulating veterinary practice.

Various facts of great interest may be obtained from a study of these reports relative to the development of veterinary service in different sections of the country and, in the later reports, comparing the gain and loss in certain sections with other sections. In the earlier years, the veterinarians established themselves principally along the Atlantic Coast, from Virginia northward, and in the states bordering the Great Lakes, as far west as the Mississippi River.

In the census of 1850, it is interesting to note that nearly half of the veterinarians in the whole country were located in New York State and New York maintained the lead in veterinary population until 1910, with the exception of the year 1860, when Pennsylvania was listed with a majority of one veterinarian over New York. In 1910, Illinois took the lead, with New York second in 1920, Illinois was still leading, with New York in fourth place.

Until 1910, the larger half of the total veterinarians was located in the Middle Atlantic (New York, New Jersey and Pennsylvania) and East North Central States (Ohio, Indiana, Illinois, Michigan, Wisconsin). In 1910, the Middle Atlantic States were displaced by the West North Central States (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas). All sections of the country showed a gain in the number of veterinarians until 1910; at that time, and in

1920, only the New England and Middle Atlantic States showed a decline. Among the individual states showing a decline (1920), New York stood first, with a loss of 127 veterinarians.

Although the majority of the veterinarians is located in the North Central States, the rate of increase from 1910 to 1920 has been greater in the Southern States than in any other section. In North Carolina the number was trebled and in a number of other southern states the numbers were more than doubled. The tide of the veterinary population is apparently receding from the north-eastern section of the country and increasing in the North Central States, and the South.

In the census of 1870, information was given relative to the nationality of the veterinarians as follows: Americans, 63.8%; British, 20.4%; German, 10.5%; other nationalities, 5.3%.

That the female veterinarian is a recent development seems to be contra-indicated by the fact that in 1890 two were listed; in 1900, fourteen; in 1910, none; in 1920, one.

If, in 1850, there had been 48 states in the Union, only 46 of them could have been supplied with a veterinarian; two states would have been without veterinary service. On the basis of the 1920 report, an equal apportionment would have provided each state with 281 veterinarians and six of the states could have had an extra man. This represents the numerical growth of the profession in 70 years.

The six states containing the greatest number of veterinarians in 1910 maintained that honour in 1920, but there was a rearrangement of their order, as shown in Table II.

Table II.—Relative Positions of States in 1910 and 1920.

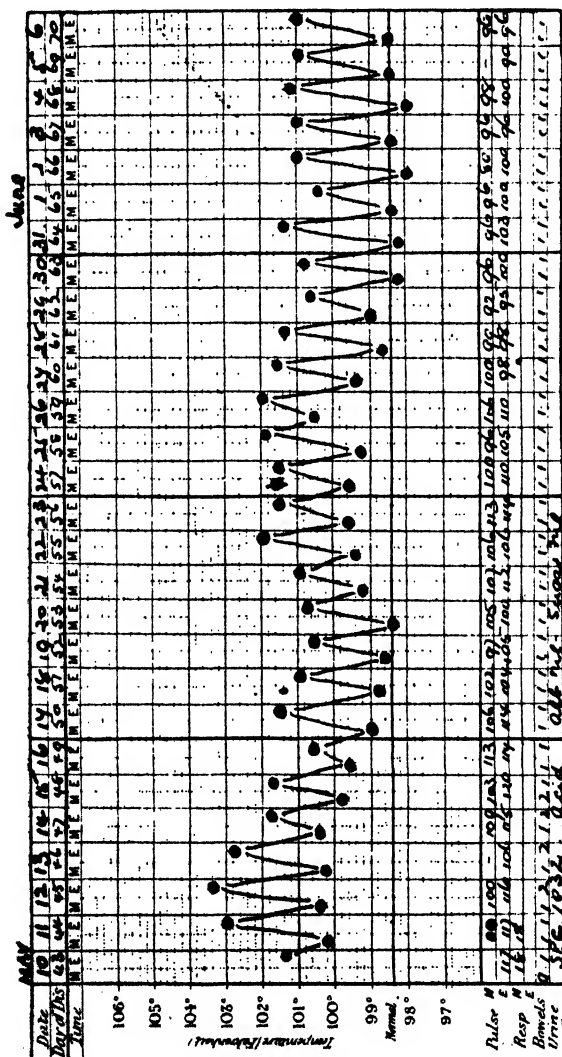
RANK	STATE	1910	RANK	STATE	1920
1	Illinois	1038	1	Illinois	1146
2	New York	981	2	Iowa	972
3	Ohio	782	3	Ohio	860
4	Iowa	692	4	New York	854
5	Pennsylvania	676	5	Indiana	754
6	Indiana	637	6	Pennsylvania	698

Iowa displaced New York and Indiana displaced Pennsylvania.

The report of the 1920 census was of particular interest, coming as it did soon after the close of the World War, in which approximately 20 per cent. of the veterinarians participated. The present decade, with a reduced number of veterinary schools and a consequent lessened production of veterinarians, along with other factors affecting the profession, will give still greater interest to the report of the not-far-distant 1930 census.

A Case of *Brucella Abortus* Infection in Man.

It has been known since 1924 that the bacillus of Bang, which was discovered by Prof. Bang of Copenhagen in 1897, was capable of producing in man a disease indistinguishable clinically from Malta fever. The bacterium is now called *Brucella abortus*, after Surgeon-Major Bruce, who isolated the specific organism of Malta fever in 1887 and called it *Micrococcus melitensis*. It is now known as *Brucella melitensis*. Both Malta fever and Bang's disease are characterized



by prolonged fever, profuse sweats, joint pains, enlargement of spleen and liver, leucopenia and anæmia. The character of the fever is undulating, hence the name "undulant fever," which is applied indiscriminately both to Malta fever and Bang's disease. Both diseases come from milk, in the case of Malta fever from goats' milk, and in the other from cows' milk. In cattle Bang's bacillus produces an epidemic abortion, which is very infectious, very common, and a source of great loss to farmers. In Gloucestershire, the veterinary surgeons tell me, epidemic abortion is extremely rife, and defies all the care and precautions taken against it.

The opinion has been held for many years that abortion in women is produced by drinking milk from cows that have expelled their fetuses prematurely. In 1917 an American published a series of 12 cases in which circumstantial evidence pointed to abortions in women having been due to drinking infected milk. It is interesting to note that the organism which gives goats that disease of the udders which causes Malta fever in man has the effect on the goats of causing abortion, so that both *Brucella melitensis* and *Brucella abortus* are abortion-producing bacteria.

Since 1924 numbers of cases of Bang's disease in men have been reported and, if one looks up the references in a library, such as the Radcliffe section of the Bodleian, the number of cases and articles are surprising, especially when it is realized how little is known of the disease even now. When my case occurred at least six medical men of much higher attainments than myself had never heard of it when I asked them for their opinion.

The manifestations of *Brucella abortus* in cattle are, in the female, abortion and its sequelæ, and in the male, occasionally tissue necrosis in the generative organs. The human manifestations are abortions in the female, together with an illness, and in the male, a prolonged fever with the symptoms mentioned above. The infection is easily mistaken in its early stages for typhoid or tuberculosis.

In the case that came under my notice in April, 1929, there are several points which make it interesting. The first that strikes one is that perhaps the last person one would suspect of having this milk-borne disease would be our local dispensing chemist, who drinks practically no milk, never goes near a cow, and sees nothing of any farm hands except across the counter. He is 50 years of age and has never been abroad. He gets influenza often, and he began to feel ill at the end of March, 1929, with chilliness and aching in his limbs, just as he always has with influenza. He went to bed, and I treated him as a case of influenza, taking his temperature every morning when I visited him. To my surprise his temperature was always 100° to 102° long

Pathologist, he tests all blood specimens for agglutination with this organism.

The patient came into the Fairford Cottage Hospital in May. He had been ill for five weeks before admission with a continuous pyrexia without physical signs, a feature of the illness being drenching sweats at night—so drenching that we had to have a special nurse to change his night things two or three times every night. Beyond this sign and the fever there was nothing to be made out on examining him. There was nothing abnormal in the urine; no enlargement of spleen or liver; no arthritic signs or symptoms; nothing abnormal in chest or throat. There was no diarrhoea and no sickness, and he took food well. Once he was in Hospital he began to pick up and put on weight, in spite of the fever, which went on for fourteen weeks, and the rapid pulse, which never fell below 100. Now that he has been afebrile for some time his pulse is still over 100, though I cannot find anything wrong with his heart. The chart shows the undulating character of the fever well.

As to treatment, I could find very few references to it except urotropine gr. x *t.d.s.* We tried large doses of quinine without effect. Dr. Gardner was making a vaccine, but by that time he was so much better. At last the patient himself said he would like to try salol, and from that moment his temperature dropped—*post hoc* almost certainly, but salol would be worth trying in another case.

Dr. Davey's report dated May 23rd says—The following are the findings so far:

1. The brother's serum shows no agglutination. (The brother had influenza too, and we wondered if he had Bang's disease also).

2. Patient's serum agglutinates *B. abortus* 1 : 25, 1 : 50, 1 : 125, 1 : 250, 1 : 500, 1 : 1000, 1 : 2500, 1 : 5000 dilutions. (*N.B.*—This is the highest dilution reported in any previous case I believe.)

3. Patient's serum agglutinates *B. melitensis* 1 : 25, 1 : 50, 1 : 125, 1 : 250, 1 : 500 dilutions.

4. Patient's blood has so far not yielded any organism in culture.

5. Patient's leucocyte count is 5000 per c.mm., polymorphonuclears 42%, small lymphocytes 45%, large hyalines 8%, myelocytes 5%, showing a leucopenia with a relative lymphocytosis. These facts, says, Dr. Davey, clinch the diagnosis beyond yea or nay.

Since my case there has been a case reported in the *British Medical Journal*, the eighth in England they say. This makes the ninth. The point is that it is worth looking for in puzzling cases of fever without physical signs. If anyone wishes to read up the subject he will find many interesting references in the Bodleian, but the best account is a report of a symposium on the subject in the *Journal of the American*

Veterinary Medical Association for March, 1929, from which I have borrowed most of the first part of this account.

H. E. BLOXSOME.

E. N. DAVEY.

[It may be added as a postscript that on August 20th, five months after the onset, the blood picture is the same. The serum does not agglutinate the *Brucella abortus* in so high a dilution. Tachycardia and general weakness are still present. These facts point to the infection being still present, though waning. As in Malta fever, the infection may take two years to disappear. Meanwhile the patient is still taking salol.]

(*St. Bartholomew's Hospital Journal*.)

Experiences with Epidural Anæsthesia from the Obstetric Point of View.

By JOHANNES RICHTER,

*Institute of Zootechny and Obstetrics, University of Leipzig.**

SACRAL or epidural anæsthesia was introduced in obstetrics by Cathelin in 1901, and by Stöckel in man was first carried out in 1909.

Pape and Pitzschk have conducted experiments on horses and Benesch on cattle (1926); the tests of the last author dealt with the possibility of allaying labour pains, the pains of embryotomy and prolapsus uterus and the use of the method in ovariectomy of cows and mares.

The author has conducted epidural anæsthesia on 80 animals at the Leipzig clinic, including practical parturition cases and 20 test and demonstration animals. As regards the technic of the operation, the injection place is on the dorsal side of the root of the tail, and lies between the first and second coccygeal vertebra. It can be felt as a wide hollow. The needle is pushed in forwards at an acute angle into the spinal canal drawn back a little and the contents of the syringe emptied. As anæsthetics, 0.5 to 1.5 per cent. tutocain (Benesch) or chemocain 1 to 2 per cent. (Richter), are used. Symmetrical anæsthesia begins in 3 to 5 minutes and affects the anus, perineum, womb and rectum, and after 15 minutes extends in an elliptical form whose outer boundaries extend from the middle of the sacrum via the angles of the ischium to the inside of the thighs. In the case of too large doses weakness of the hind extremities, staggering and falling down occur.

Richter describes some cases of parturition in cattle which were treated under epidural anæsthesia. Among them embryotomy of an

* *Berliner Tierarzt Woch.*, No. 1, 1929 (Ex *Schweizer Archiv. für Tierheilkunde*, July, 1929). Translated by Mr. J. T. Edwards, B.Sc., M.R.C.V.S.

emphysematous calf without any reaction of the patient (straining, pressing, lying down, pains, etc.) being evident.

A torsio uteri of a cow pregnant with twins was remedied by rolling of the animal and both calves easily delivered. Amputation of the left hind limb of a foetus was accomplished with ease in a quiet standing animal. A case of commencing abortion was remedied by strong traction, after use of 1 per cent. chemokain, without the animal lying down or knocking about.

The next group of patients, 16 in number, comprised cases of retention of the secundines and was treated by epidural anæsthesia and manual removal of the cleansing. The advantages according to Richter are the passive state of the genital canal and rectum, and removal of the afterbirth under pleasant conditions for the operator and patients (no straining and pressing, and no voidance of dung and urine, etc.). Richter states that vaginal clamps can be put on in cases of prolapse without any pain to the animal but the anæsthesia is not sufficient to do away with abdominal pressure in cases of total prolapse of the uterus. Richter also employed the method in treating cases of puerperal affections of the uterus and sterility and also in performing ovariectomy in cattle. In the smaller ruminants, and in cats and dogs, there is room for improvement as to the certainty of epidural anæsthesia.

Götze of Hannover, writing in D.T.W. (36-883) uses as a rule 10c.c. of a 0.5 per cent. solution of tutocain or novocain in cattle practice. He has employed it in difficult parturitions, embryotomies and torsion of the uterus. He uses the method also in examinations and treatment for sterility. For operations on the penis, amputation of the udder and Cæsarean section high sacral anæsthesia is employed. Thirty c.c. of a 3 per cent. tutocain solution is injected with a 14 c.m. long and 1.7 c.m. needle with mandrin, between the last lumbar vertebra and sacrum.

News

Veterinary Science in Estonia.

Veterinary Science in Estonia is of University standard, the qualifying degree being only obtainable after a five years' course in the Veterinary Faculty of the University of Tartu—this being the name by which the former City of Dorpat is now known.

The Veterinary School of Dorpat was founded in 1848 and was added to the University as a Veterinary Faculty in 1919.

The teaching staff, which is twelve in number, includes Professors, Academic Lecturers, and one Prosector; the Dean of the Faculty being Dr. Med. Vet. K. Saral, who also occupies the Chair of Surgery.

There are three separate clinics, those respectively being named the internal, surgical, and that of the small animals.

Mr. Jules Tehver, a veterinary graduate, is the Scientific Stipendiary of the Tartu University.

Empire Marketing Board.

FELLOWSHIPS IN SOUTH AFRICA.

ARRANGEMENTS for the institution of three fellowships at Onderstepoort laboratory have been completed between Major Elliot, the chairman of the Research Grants Committee of the Empire Marketing Board, and Dr. Dutoit, the Union Director of Veterinary Research.

The appointments will be in the neighbourhood of £1,000 per annum, and will each be tenable for five years.

The actual recommendation of candidates to the Marketing Board will be made by a committee of which the president of the Royal Society has consented to act as chairman. The High Commissioner for South Africa will represent the Union Government.

The Marketing Board is providing a capital grant of £10,000 for building or library extension required in connection with the scheme, and is also providing an annual grant of £11,000, of which £3,000 will be used for the fellowships, and the balance will be used in connection with the research to be carried out.

The Union Government's share of the scheme lies in placing Onderstepoort's facilities at the disposal of the selected candidates.—*Reuter.*
(*The Daily Telegraph.*)

Reviews

Canine Nursing. By DAVID ERIC WILKINSON, M.R.C.V.S. 40 pages, 5 illustrations. Bradford. Watmoughs, Ltd. Price 3/6 net.

In a small text book of some 40 pages Mr. Wilkinson has condensed the work of many years' practical experience of canine nursing, and the book will be useful to those who have canine infirmaries or those who

desire to follow up this branch of veterinary work as a profession. Commencing with the introduction of the reader to the subject on general principles, Mr. Wilkinson discusses the general lay-out of a hospital operating room and kennels attached. Then follow some very useful little hints for the amateur on the preparation of the patient before and after a severe operation; with a chapter on the administration of medicines and the general routine followed in most of the large canine hospitals. These hints will be especially useful to the young probationer in canine nursing, and some of them too may usefully be taken to heart by the veterinary student. The final chapters deal with Dietetics and General Nursing; and, as a high proportion of the students in the various Veterinary Colleges will in all probability take up practices where there are a lot of canine patients, and the small cost of the book brings it within the range of everybody, we can confidently state that this little manual should be given a place on every student's bookshelf, as well as that of every existing canine practitioner.

Modern Horse Management. By MAJOR REGINALD S. TIMMIS, D.S.O. Revised Edition. London. Cassell & Co. pp. 325, with 80 photographs. 15/- nett.

MAJOR REGINALD TIMMIS is well known as an enthusiast wherever the horse is concerned, and the fact that his book on Horse Management has passed into a second edition is proof of its popularity. Divided into some thirteen chapters the subject headings cover a very wide range, perhaps rather wider and deeper than any one mind should attempt, and although the veterinary aspect can only be looked upon as written by an amateur, it would be as well for the author to have the technical statements supervised and corrected before they are passed into the hands of other amateurs. The paragraphs on vaccine therapy and such like would be better to be left unwritten, and the statement that "eight to sixteen ounces of chloroform will be required for a half hour operation" is a dangerous one to inculcate into the mind of an anaesthetist. One wonders where the idea comes from that "It is usual to remove the hobbles as soon as the horse is insensible." Statements like this spoil an excellent book, which otherwise has many points of value and interest to the veterinary student whilst in his second year of study for the examination in Stable Management.

Publishers' Notices

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THE VETERINARY JOURNAL

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PRINCIPAL OF THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor :

GLADSTONE MAYALL, M.R.C.V.S.

NOVEMBER, 1929.

Editorial

VETERINARY EDUCATION.

THE year 1929 will always be an eventful one for the British Veterinary profession, as in its last quarter official steps have been taken, which, if finally approved and carried out, will advance veterinary science enormously and do much to raise it to the social standard which it should automatically and deservedly occupy in the scientific world.

It is particularly to the student to whom the benefit is to be applied, as, if the recommendations of the Report of the Departmental Committee on the Reconstruction of the Royal Veterinary College are adopted, the modern veterinary student will have an Alma Mater to look back upon of which he will be proud ; and those who have worked in, and graduated from, well equipped and well organised surroundings know full well their advantage as compared with " makeshift " places and ill-supplied wants.

The Government Departmental Report has now been issued and on other pages of this issue of the VETERINARY JOURNAL we publish the most important abstracts, to which we invite the careful attention of our readers.

The present state of the buildings is, as stated in Lord Lovatt's Report, and reiterated in that of this present Departmental Committee, a "national disgrace." It positively cannot be allowed to go on. It has been neglected too long already, and one hopes most fervently that some substantial start will be made before the forthcoming International Congress, so that we may then at any rate show proof that remedial measures are at last being taken to make amends for past neglect.

The addition of another year to the College Curriculum is a necessity which one would like to have avoided on the ground of the additional expense it means to the student, but it is unavoidable if the prescribed subjects are to be taught, and digested, thoroughly and efficiently. The actual details of the scheme are not yet for publication, as the matter has not finally received the sanction of the Council, but their necessity is obvious, not only to the graduate but to the student himself, who knows full well the scramble it is to attempt to conscientiously study everything on the present Syllabus within the prescribed four years.

Both Schemes are of the right kind to help forward our profession scientifically and socially, and the sooner they each come into operation the better for everybody concerned.

General Articles

ABSTRACT FROM THE REPORT OF THE DEPARTMENTAL COMMITTEE ON THE RECONSTRUCTION OF THE ROYAL VETERINARY COLLEGE.*

Minute of Appointment.

I HEREBY appoint the following to be a Committee to consider and report generally on the reconstruction of the Royal Veterinary College and the probable cost; and in particular on the questions what accommodation should be provided, having regard to the training to be given; whether that accommodation can and should be provided on the present site; if not, where the College should be transferred; and what arrangements should be made in respect of the Animal Pathology Research Institute now situated at the College, if it appears necessary to change the existing arrangements:—

Dr. O. CHARNOCK BRADLEY, M.D., D.Sc., M.R.C.V.S.

Lt.-Col. Sir MERRIK R. BURRELL, Bart., C.B.E.

H. E. DALE, Esq., C.B.

Sir W. M. FLETCHER, C.B., K.B.E., Sc.D., F.R.S.

Sir J. R. JACKSON, M.R.C.V.S.

Professor J. SHARE JONES, D.V.Sc., M.Sc., F.R.C.V.S.

Sir C. J. MARTIN, C.M.G., M.B., D.Sc., F.R.S., F.R.C.P.

Sir E. COOPER PERRY, M.D., F.R.C.P.

Major-General H. T. SAWYER, C.B., D.S.O.

Lt.-Col. Sir ARCHIBALD WEIGALL, K.C.M.G.

I appoint Sir C. J. MARTIN to be Chairman, and Dr. V. E. WILKINS, of the Ministry of Agriculture and Fisheries, to be Secretary.

(Signed) WALTER GUINNESS,
Minister of Agriculture and Fisheries.

30th July, 1928.

Abstract from the Report.

The terms of reference were interpreted as relating not merely to the Royal Veterinary College and the Animal Pathology Research

* The Complete Report can be obtained from H.M. STATIONERY OFFICE at the following addresses: Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any Book-seller. Price, 1s. 3d. net.

Institute as buildings, but as bodies with traditions and aims, and in pursuance of this interpretation, in addition to dealing with the question of physical reconstruction, suggestions were made regarding constitution and government.

Evidence has been taken from the following witnesses :—

Dr. W. H. Andrews, D.Sc., M.R.C.V.S., Director of the Veterinary Laboratory of the Ministry of Agriculture and Fisheries.

Professor G. W. Clough, D.Sc., Royal Veterinary College.

Professor F. T. G. Hobday, C.M.G., F.R.C.V.S., F.R.S.E., Principal of the Royal Veterinary College.

Sir John McFadyean, M.B., B.Sc., M.R.C.V.S., late Principal of the Royal Veterinary College.

Dr. F. C. Minett, D.Sc., M.R.C.V.S., Director of Research, Research Institute in Animal Pathology, Royal Veterinary College.

Major-General Sir John Moore, K.C.M.G., C.B., F.R.C.V.S.

Mr. T. C. Wight, Secretary, Royal Veterinary College.

It is unnecessary to emphasise the deplorable condition to which the College has been reduced both as regards buildings and finance. The matter has been dealt with in the recent report of the Committee on the Colonial Veterinary Service, of which a pertinent extract is attached (Appendix A). That Committee visited the College in order to verify the disturbing evidence they had received concerning it. They report : " We do not hesitate to say that we were dismayed by what we saw." The facts, moreover, are well known to the Ministry of Agriculture and Fisheries. Suffice it to say, therefore, that with the exception of one building which is of fairly recent date, the College is in a state of dilapidation and the work is being carried on under conditions which are a national disgrace. As regards finance the end of the current year will find the College devoid of all reserves, with its prospective income insufficient to cover essential expenditure. The Governing Body have only been able to accept students for the coming session on a semi-official statement by the Ministry that, even if the College had to close its doors, the Government would be unlikely to refuse the financial assistance necessary to enable the Governors to discharge their obligations towards students who had been accepted for training.

So long as the students were passing examinations and Camden Town was recognised as one of the important centres of veterinary education, it was assumed that all was well. Actually, however, the process of degeneration had set in years ago, and the ideals of scientific

attainment desirable for a veterinary surgeon, and the status of the veterinary profession, cannot fail to have suffered by the lack of proper educational facilities and the unworthy conditions by which the students were surrounded.

A possible way out was offered after the War, when the Ministry made a definite suggestion to the Governors for the transference of the College to Cambridge. For reasons which on consideration we are bound to say appear to us to have been adequate, the Governors could not see their way to accept the suggestion.

When the College was founded in 1791 the veterinarian was a horse-leech. As knowledge of the nature and causes of disease grew his sphere of usefulness was correspondingly enlarged, and at the same time his educational requirements became more extensive and costly. Of late years, the enlistment of veterinary science into the service of the State has occurred more and more generally, and the interests of stock-raising, dairying and the public health now absorb a considerable proportion of the profession. This tendency will continue in an increasing degree in every civilised State. The equipment and staffing of a modern veterinary college must provide not only for the supply of general veterinary practitioners, but for the demands of the State and public authorities.

Subject to the above conditions our preliminary deliberations were designed to answer the following questions :—

- (a) What training should the College provide ?
- (b) For how many students should provision be made ?
- (c) Is a rural site or a town site preferable ?

The Training to be Given.

As some prominence has been given to the suggestion that it would be in the ultimate interests of the veterinary profession if the first year's studies were taken before the students entered the College for the more strictly " professional " part of the course, we investigated this point and took evidence upon it. At present, the R.C.V.S. regulations would prevent it, but even assuming they were amended to make the proposal practicable, we doubt its desirability. It is unlikely that the arrangement would lead in practice to much intermingling between veterinary students and those of other faculties ; the veterinary classes would probably be under separate teachers, and opportunities for association with other students would be few. On the other hand, by taking their first year's course outside the veterinary college, the students would be deprived of the benefit of that early contact with the College teachers, and with the general atmosphere of veterinary work, which is often helpful in stimulating their interest

in the profession they are proposing to enter. From the financial standpoint, little would be gained. There might be a small saving in the capital cost of the new building if provision had not to be made for teaching the preliminary sciences, but as regards maintenance the "farming out" of such teaching to another institution would probably be uneconomical. It is recommended later that the department presided over by the professor of chemistry should also be responsible for toxicology, and that directed by the professor of biology for protozoology and entomology, an arrangement making for unity between the teaching of these preliminary sciences and their extension and application to the more professional subjects of the curriculum. Further, we are convinced that collegiate association with a chemist and a biologist is of very great value to colleagues who are engaged in teaching and research in the departments of physiology, pathology, bacteriology and epizootiology.

We are, therefore, of the opinion that the Royal Veterinary College should continue to make provision for the teaching of the first year's subjects.

Views have been placed before us to the effect that greater attention should be paid to the subjects of animal husbandry, the principles of genetics and the hygiene of milk and meat; and we notice also that the Colonial Services Committee emphasises the need for a sound working knowledge of animal genetics and nutrition as a part of the qualifications required by the Colonial veterinary service. So far as we are concerned as a Committee, we have confined ourselves to making provision for any necessary strengthening of the existing curriculum, in the proposals for building and staffing which we submit later in this report. If these proposals are adopted, they would enable the College to provide training adequate to the needs of veterinary science in this country. Moreover, by including reasonably generous research facilities and an adequate and qualified teaching staff, they would meet any likely demands for post-graduate and "refresher" courses for home veterinary surgeons; and—a point to which we attach great importance—would place the College in a position to offer the post-graduate courses suggested by the Colonial Services Committee as being essential to the proper training of veterinary surgeons for work in the Colonies.

On the basis of the above considerations, we have come to the conclusion that the College should make provision for the following nine departments:—

Surgery and obstetrics;

Medicine;

Animal husbandry, zootechnics, hygiene and State medicine and the production of meat and milk ;
 Pathology, with bacteriology and animal parasitology ;
 Pharmacology and therapeutics ;
 Physiology with animal nutrition and bio-chemistry ;
 Anatomy, surgical and applied anatomy, histology and embryology ;
 Biology, protozoology, entomology and genetics ;
 Chemistry with toxicology and elementary physics.

Each department should be in the charge of a whole-time professor, with at least one whole-time senior assistant. There should be adequate facilities for research and post-graduate work, and rooms for extra lecturers and research workers should be provided.

Number of Students to be Provided for.

The number of students in training at the Royal Veterinary College during the past few years has ranged from 128 in 1924-25 to 157 (including 17 women students) during last session. The total entry at the remaining three veterinary colleges in Great Britain, viz. Edinburgh, Glasgow and Liverpool, amounted last session to 216. We are informed that these numbers are insufficient to provide the required recruits into the ranks of the veterinary profession under present conditions.

It is necessary also to bear in mind the probable demands in the future. We have considered this matter, and are of opinion that the demand for veterinary surgeons in this country will expand. Every year the importance of the preventive side of veterinary medicine is coming into greater prominence, and the number of veterinary surgeons required to fill public appointments increases. Further, the agriculturist is becoming more appreciative of the value of the veterinary surgeon's assistance, not only in combating epizootic diseases, but in solving economic problems associated with the yield of meat and milk.

We are of opinion that in planning the new veterinary college provision should be made for an annual entry of 75 students, with total accommodation for 250. This assumes that of the students entering the college, only about 80 per cent. will proceed beyond the first year—an assumption based on actual experience in the past. In providing for a total of 250 students (men and women) we have assumed that entries to other veterinary colleges will also increase, and that it is not the policy of the Royal Veterinary College to attract students who might otherwise have gone to Edinburgh, Glasgow, or Liverpool.

The Site.

We turn now to the vexed question of the location of the College. There have, we are informed, been differences of opinion on this point, and unfortunately the feeling has arisen that the decision of the Governing Body not to transfer to Cambridge, mentioned above, was influenced to some extent by personal considerations, and the desire to preserve the individuality and independence of the College. We would like to make clear, therefore, that the conclusion to which we have come, which supports entirely the view previously taken by the Governors, has been arrived at solely from consideration of the interests of veterinary education, and after taking account of every aspect of a rather difficult problem.

In the first place it is significant that the most successful veterinary colleges have been situated in the vicinity of cities. Utrecht, Leipsig, Vienna, Alfort, Milan, Riga, Stockholm, are a few of the leading veterinary institutions of Europe; in all cases they are situated in great centres of population. The reasons are not far to seek. First, it is vital to a sound training in medicine, whether human or animal, that ample facilities should be available for the demonstration of actual sickness and disease. In medicine, this is secured through the hospitals; in veterinary science, through the clinic which must always be associated with the veterinary college. It is of the utmost importance that a ready flow of sick animals should be passing continually through the clinic, and this can obviously only be secured in a thickly populated district. Second, the city has advantages from the standpoint of accessibility to students, and—more important still—makes possible the intermingling of teachers and students of various faculties, and so obviates the very real dangers of intellectual isolation.

It is true that the city veterinary clinic is largely composed of horses, dogs and cats, and that from the agricultural standpoint it would be better if farm animals were the rule rather than the exception; but this seems to be a drawback which is insuperable. A veterinary college in the country would lose almost completely this invaluable connection, and it is more than doubtful if farm animals in any numbers would be forthcoming to fill the gap.

It has been urged that the veterinary surgeon's training ought to contain more provision than it does for acquainting students with first hand knowledge of the farm animal in health, and this view has been put forward in support of the contention that a rural site, with a farm attached, is desirable, or at least that the college, if situated in a city, should have a farm on the outskirts to which students could be taken to gain acquaintance with animal husbandry as part of their course of study. We agree that the more the veterinary surgeon knows

about the healthy animal the better qualified will be to treat the sick one, and that if in his already crowded course it is possible to increase the provision for imparting practical knowledge of stock management it would be all to the good; but we hardly think it necessary that the College should own a farm for the purpose. Experience on a farm and subsequent residence with a veterinary surgeon during vacations would give the student a good deal of insight into the practical conditions of stock management, and during terms it should be possible to make arrangements for instructional visits to one or other of the educational farms which are now established in all parts of the country.

We feel, therefore, that the weight of evidence is in favour of an urban site, and having come to that conclusion, the next point to establish is where the site should be. Before discussing that subject, however, it is necessary to consider another important question that has arisen, namely, that of the desirability or otherwise of affiliation with a University.

University Affiliation.

The Royal Veterinary College at present has on its staff teachers who are "recognised" by the University of London for the purpose of the instruction requisite for the internal degree of B.Sc., in Veterinary Science. That degree can, therefore, be taken from the College, and a small proportion of the College students are now studying for the University degree as well as for the diploma of the Royal College of Veterinary Surgeons. This constitutes, however, the sole link between the University and the College; apart from it, the latter is an entirely independent body, pursuing its own course, and deriving no advantage from its close proximity to the greatest centre of learning in the Empire. The College students live either at home or in rooms in various parts of the metropolis; there is little corporate life, and no opportunity for mingling with the great band of aspirants for University graduation who are destined to recruit the ranks of scientific workers at home and abroad.

From every point of view this is wrong. All branches of science have much in common, and the intermingling of students assists in creating the broader outlook and spirit of co-operative endeavour which contributes so largely to scientific progress. Moreover, the community life resulting from membership of a University is helpful to the students in their recreations and games, and encourages the true conception of citizenship which in their after career will be so great an asset. The isolated atmosphere in which the Royal Veterinary College has pursued its course in the past has been bad for the students and for the

large section of the veterinary profession which they represent. We feel that the possibility of organic association with a University should be one of the factors governing a decision on the question of the future situation of the College.

Assuming that the College were accepted by the University as a school, it would have in the first place the advantage of University status both in relation to its educational work, by which students at the College could proceed to the University's internal degree without necessarily receiving all their instruction from Recognised Teachers, and on the social side in so far as the students would be able to avail themselves of such facilities for social intercourse as belong to the University as a corporate body. It would not follow that all students of the College would automatically become internal students of the University, as it is obvious that the University could only describe in this way those students who were taking the University degree; but under the new statutes the remaining students of the Royal Veterinary College, who at present form the large majority, would, as in the case of non-matriculated students of London medical schools, be "associate" students of the University, and would be eligible for all the privileges available for students of the University as a whole.

In our opinion London is in many ways admirably suited for the purposes of a veterinary college. There is, it is true, one important drawback, in the fact that it contains no agricultural college, and the association of veterinary science with agriculture is too clearly desirable to make it necessary for us to emphasise it in this report. On the other hand, a veterinary college in London can, with proper organisation, have the advantage of close touch with the medical and other science schools of the University, including the London School of Hygiene and Tropical Medicine with its Field Institute of Agricultural Parasitology—an important benefit, especially in relation to the requirements of the Colonial veterinary services. On the whole, therefore, and in view of the long association of the Royal Veterinary College with London, we are of the opinion that a transfer to another city would be inimical to its best interests.

The Camden Town Site.

There remains to be considered the question of the site. The present site at Camden Town is approximately $2\frac{1}{2}$ acres in extent, and has been the home of the College since its foundation in 1791. The site is held on a 99 years' lease (from 1923) from the Ecclesiastical Commissioners, which provides that the premises are to be used only as a veterinary College.

It is admittedly not an ideal position for an educational institution. It is in a congested district; the noise of traffic is a hindrance to lecturing and research work, and the general outlook of the College is not inspiring to the students. There are, however, compensating advantages. The site is readily accessible from most parts of London. It is close to the Islington Cattle Market. The college is able to secure an abundance of the smaller animals for the clinic, and an appreciable number of horses. University College, the London School of Hygiene and Tropical Medicine, and the central University site at Bloomsbury, are in reasonable proximity. No other area of land of sufficient size is available in the neighbourhood, and after examining the possibilities of alternative positions with some thoroughness, we came to the conclusion that it would be a mistake to remove the College from Camden Town, unless it were found impossible to provide there all the requisite buildings and facilities for a well-equipped modern veterinary college on the lines which we have indicated above to be desirable.

The Research Institute.

The Animal Pathology Research Institute was erected in 1926 at a cost of about £33,000, towards which the Ministry paid a grant of £31,500. A maintenance grant of £5,000 per annum is forthcoming from the Development Fund. The Institute is governed by a Research Committee appointed by the Governors, consisting in part of members of the General Purposes Committee (the effective Governing Body of the College) and in part of members appointed from outside. The Committee has decided that the attention of the Institute should for the present be devoted to a study of the more important contagious diseases of cattle, such as epizootic abortion, Johne's disease and mastitis.

We consider that the grant of £5,000 per annum is insufficient for really effective work on animal diseases.

A more fundamental defect of the existing condition concerns the relationship between the Research Institute and the College. We deprecate the arrangement which appears to have obtained hitherto under which the Institute, although ultimately under the same Governing Body as the College, has carried out its work as a separate unit, to the mutual disadvantage of both. The closest relationship should exist between the two, not only by reason of the "inspiration" which research gives to teaching, but because a teacher is not likely to induce even the best type of student to consider the possibility of scientific investigation as a career unless he himself is actively engaged in research. Otherwise he fails to infect his students with enthusiasm to increase the bounds of knowledge, and as a consequence the next

generation lacks capable investigators. If the Research Institute had not already been in existence, we would have recommended the erection of one building only for both College and Institute, so as to secure the fullest measure of contact between teaching and research. In the circumstances, the practical scheme open to us is to link up the College building physically with that of the Institute, and to use such influence as we may be able to exert through the medium of this report by emphasising the need for such internal organisation as shall ensure intimate co-operation between the work of the College and the Institute.

The present Director of the Institute is strongly in favour of moving it to a rural site, mainly in view of the difficulty of conducting investigations into the diseases of large animals in a congested urban centre. We appreciate the force of his arguments, but we think they are outweighed by two considerations: first, that it would be more effective and economical to strengthen the other research institutes in animal pathology than to build a new one; second, that in the interests of veterinary education it is clearly desirable to retain the Research Institute in close contact with the College. At the same time, we agree that the Research Institute is cramped for space, and is in urgent need of land in the vicinity of London for the purposes of experimental work with farm animals. The provision of such a field station might also be made an asset to the College for the purpose of occasional demonstrations to the senior student and in other ways.

Rebuilding Proposals.

The schedule of accommodation which was submitted to the architects is printed as Appendix B to this Report. We would draw special attention to the fact that adequate provision is made for staffing and research facilities for each of the nine requisite departments of the College, on lines which would not only fulfil the conditions of a school of the University of London, but would also meet the requirements of the Colonial Veterinary Services as adumbrated in the proposals of the Colonial Veterinary Services Committee for the establishment of a School of Tropical Veterinary Medicine.

The existing site of $2\frac{1}{2}$ acres is more restricted than is desirable to allow for future extensions of the College, but an additional half-acre adjoining it on the north side could, we understand, be acquired.

After considering the matter fully, and preparing complete plans, the architects were able to satisfy the Committee that a college containing all the accommodation mentioned in the schedule could be erected on the existing site. The approximate cost would probably be in the neighbourhood of £280,000, although this figure would be slightly reduced if the buildings were erected on the smaller area. This estimate

includes fittings and equipment. The building scheme could be carried out over a period of, say, three years, without seriously interrupting the work of the College.

The total cost of the building scheme may be approximately estimated at £300,000. This scheme represents, in our opinion, the *minimum* provision which should be made for the building of a modern, suitably-equipped veterinary college at Camden Town.

Staffing and Maintenance.

If our proposals were put into effect in their entirety the total salary bill would be in the neighbourhood of £20,000 per annum, as against the present figure of £6,700. It has also to be remembered that at present the maintenance of the College is involving the Governors in a loss of approximately £3,000 per annum, and that the assets from which this loss has been met in past years are exhausted. The three figures of increase thus arrived at, namely, maintenance £5,000, salaries £13,000 and charge against deficit £3,000, together make a total of £21,000 per annum. In addition, provision will be required for research expenditure in each of the nine professional departments, including the cost of animals, apparatus, chemicals, &c. Each department would require from £500 a year upwards for this purpose, according to its activity.

The above estimates of cost relate only to the College and take no account of the Research Institute. In regard to the latter, we recommend (a) that the annual maintenance grant from the Ministry should be considerably increased ; (b) that a sum of £25,000 should be provided for the purchase and equipment of an area of land in the vicinity of London to enable the Institute to conduct under proper conditions experimental work with the larger animals.

(To be continued.)

LEAVES FROM A SUFFOLK PRACTITIONER'S DIARY.

By J. M. BUCHANAN, M.R.C.V.S.,
Stowmarket.

THESE random jottings from the notes of humdrum everyday events in the life of a country practitioner may be of sufficient interest to merit the passing notice of my colleagues. Suffolk being the "home of the pig" a good number of swine diseases come under observation.

At the moment of writing we are suffering here from a swine fever epidemic so severe that the Ministry of Agriculture has deemed it advisable to close all markets except for fat stock for immediate slaughter. A peculiar feature of the outbreak has been its virulence and the source of spread has been in many cases a mystery. No history

of new purchases at market, drovers' visits, and the usual means of contagion has been usually elicited on inquiry.

Treatment by serum inoculation in some cases has been of doubtful benefit, whereas in others inoculation used in just as severe cases has acted like the proverbial charm.

The manufacturers of serum (and the writer has tried several brands) all advise daily or repeated injections, but the price is prohibitive. What we need is a more potent cure than that already in use.

As a preventive the double injection with serum and vaccine is highly successful.

Erysipelas has been very prevalent this year but, like the poor, it is always with us. Unfortunately, this year it has taken a different form of being a thorn in the flesh, viz. as a complication of the epidemic to which we have already referred. On one farm I inoculated over 200 store pigs following an outbreak diagnosed as erysipelas. A transitory improvement in the death rate took place, then swine fever broke out but after inoculation it too died down. A month after the premises were free of restriction more deaths occurred, two typical of erysipelas and three under the category of N.Y.D., so familiar in pig diseases. Swine fever and erysipelas have again broken out on these premises.

Contagious Abortion.

Contagious abortion is a common complaint in Suffolk. The usual remark made by a client is to refer to the difficulty of "getting the cow in calf again." A routine treatment which has given good results is (1) treat all cows holding the cleansing more than 24 hours as suspects and isolate until proved innocent; (2) inject with sterile precautions *Bacillus Bang* live culture subcutaneously; (3) test the passage before service for acidity of the vagina and correct by injection of a tepid solution of potassium bicarb.; (4) isolate injected cows from other in calf cows for two months, i.e. at milking, grazing and feeding; (5) serve at the end of the period. 75 per cent. of the results have been successful. Manipulation of the ovaries in the continual troublesome case gives moderate success.

Use of Pilocarpine.

A peculiar feature of the use of pilocarpine as a hypodermic injection for impaction in horses along with eserine has been a swelling at the site of injection. The syringe was sterilized by boiling, likewise the water for dissolving the pellets. A hard lump appeared on the neck a week after recovery from the colic. It is noteworthy that since leaving out the pilocarpine no repetition of the mishap has occurred.

These random jottings may be of sufficient interest to merit more than a passing glance. If they meet with such, any labour in their compilation will be well rewarded.

THE OPERATIVE TREATMENT OF TRAUMATIC INFLAMMATION OF THE NAVICULAR BURSA WITH PRESERVATION OF THE DEEP FLEXOR TENDON.*

By PROFESSOR GERHARD FORSSELL,

The Veterinary School, Stockholm.

(Concluded.)

Cases.

CASE 1. CAVALRY HORSE, GELDING, 6 YEARS. The patient sustained "a nail tread" fourteen days previously, and markedly lame bearing very little weight on the off-hind leg. There was some swelling in the hollow of the heel, and discoloured synovial fluid was escaping from the wound. There was no fever. The nail tract was opened up and the neighbouring soft tissues removed as far as the tendon. A curved canula was inserted into the bursa which was thus irrigated with a 2 per cent. solution of Arsenious Acid. Calcium Bicarbonate was used to bring the Arsenic into solution. The horse used the limb very little for several weeks after the operation, but gradually weight was put on the leg so that after six weeks the patient could be sent home in the ambulance. The horse was then shod. Exercise was commenced after three months; but when one month later lameness reappeared the coronet was blistered (Veterinary Officer Morell). After a further six weeks exercise was recommenced and two weeks later the patient started work free from lameness. He has worked since in all harness, and nine years after the operation was quite sound. There was no proliferation of scar tissue. In the hollow of the heel there was a slight tendon thickening.

CASE 2. OFFICER'S CHARGER, GELDING, 6 YEARS. A week previously the patient sustained a perforation of the navicular bursa of the off-hind limb. He was brought to the Veterinary School in the ambulance on December 27, 1912, showing great lameness, no weight being put on the limb. Temperature 38.8°C. A discoloured synovial discharge exuded from the wound. There was slight swelling in the hollow of the heel. The temperature rose to 39°C. the following day, whereupon the operation was immediately performed. In this case resection of the tissues in the immediate vicinity of the tract was practised, the bursa being irrigated with a 2 per cent. Arsenic Solution. A marked reaction occurred and no weight was borne on the limb for several weeks. Healing of the frog wound was complete in six weeks when a shoe was put on and the animal sent home by ambulance. Moderate

* Translated by Geoffrey Brooke, B.Sc., M.R.C.V.S., formerly Assistant in the Department of Surgery, Royal Veterinary College, London.

weight was borne on the limb at this stage but lameness was distinct even at slow paces. Improvement occurred during the following weeks but when the high caulkins were removed at the end of three months, lameness increased again. The caulkins were accordingly replaced and the coronet blistered. After five months the horse was free from lameness at a slow pace ; he was sent to grass for the summer with a flat shoe applied ; in the autumn the patient had fully recovered and moved sound at all paces. Unfortunately a septic tarsitis necessitated destruction ten months later. There was no opportunity to make a *post-mortem* examination.

CASE 3. HEAVY ARDENNER*, 9 YEARS. Ten days prior to arrival the animal sustained a perforating " nail tread " in the off-fote foot. The nail had possibly remained *in situ* for twenty-four hours, and the lameness had increased markedly during the succeeding days. The nail had entered about the middle of the inner of the collateral sulci of the frog. The horn in the vicinity had been pared away and a serous, dirty discharge was escaping. A diffuse, non-fluctuating swelling the size of a plum was present in the hollow of the heel. The operation was performed the following day. The horn of the frog and neighbouring parts of the sole were removed in the usual manner. The probe showed the tract to lead directly down to the navicular bone. With a blunt bistoury an incision was made from the nail-tract backwards between the bulb of the heels, after which the exposed tendon was incised over the bone. The cartilage over its flexor surface was removed with a bent curette and the bursal cavity flushed with hydrogen peroxide followed by tincture of iodine and bandages applied. When the horse rose it was apparent that there was a radial paralysis affecting the operated limb, this being dragged along when the animal moved. Later the dressing was caught by the hind limb of the same side and completely ripped off, so that the soft tissues of the operation field came into contact with the straw. When this was observed the foot was cleansed and a new bandage applied ; considerable swelling followed, but healing proceeded satisfactorily. The radial paralysis improved after some days but the phalangeal joints were kept strongly flexed and the limb was not used. Thirty-six days after operation the wound had healed, and new horn covered the part. A leather sole and special shoe was applied, the latter designed to remedy the persistent flexion of the phalangeal joints. From the toe of the shoe a metal arm projected forwards and upwards, and from the summit of the arm four pieces of strong elastic ran back to encircle the limb above the fetlock. This system exerted a gently extending effect upon the phalangeal joints which gradually resumed their normal alignment. The patient

* This Belgian breed is the common heavy draught horse of Middle and Southern Sweden [TRANSLATOR].

then commenced to use the limb. Sixty days after operation the animal was discharged and whilst sound at the walk, he trotted lame. Four months after the operation the animal was worked on the land, and two months later according to the owner performed agricultural work well, but showed lameness if trotted on the hard road. One year after operation the horse could be used for town work and trotted sound in the streets. This case is remarkable as instancing the restoration of a heavy Ardenner to full usefulness ; whilst he was able to do useful work sufficient to defray the cost of keep.

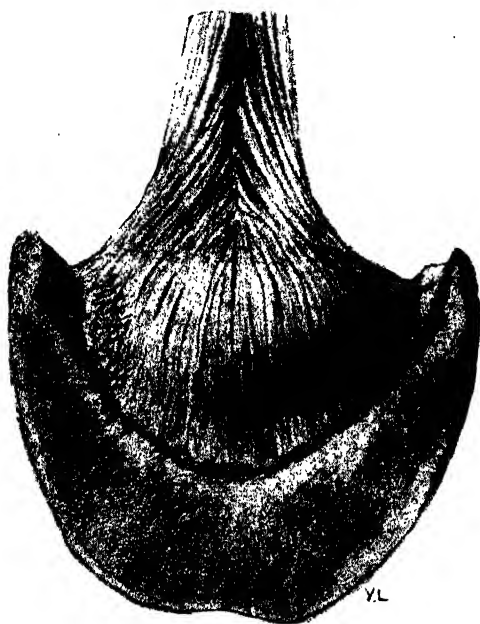
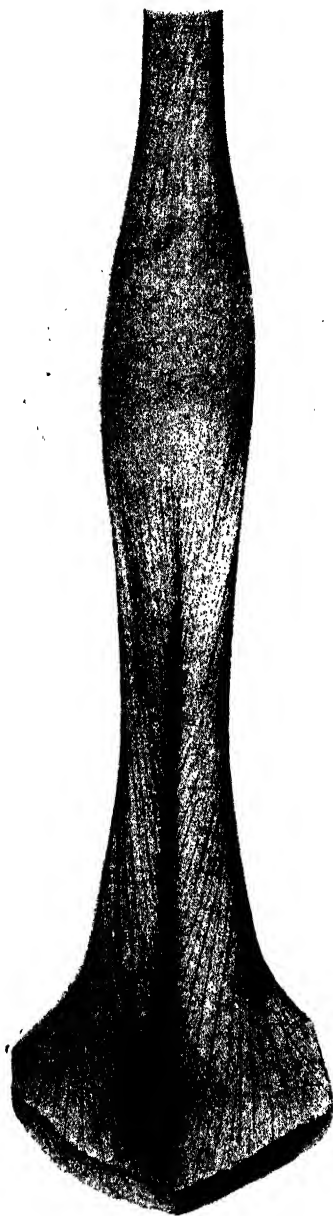


FIG. 1.—The insertion of the deep flexor tendon into the third phalanx and its lateral cartilages ; note the spiral disposition of the tendon fibres. The distal sesamoid bone lies wholly within the semi-lunar line of insertion of the tendon.

applied after six weeks, and at the end of two months the animal walked sound. The patient remained in hospital for four months and then discharged, free from lameness, at all paces. No subsequent history is available. The length of the return journey demanded that the patient remain in the Clinic until the new tissue had assumed some degree of strength.

CASE 5. DRAUGHT ARDENNER, 13 YEARS. Perforation of the bursa had occurred one week previously. Treated by Mr. Hakansson, Veterinary Surgeon, with injections of Tinctura Iodi and aseptic

CASE 4. DRAUGHT ARDENNER CROSS, 6 YEARS. This horse had been lame for a month before he was examined by District - Veterinary Surgeon Vanselin who sent him in for immediate operation. He showed marked lameness on arrival. In the inner collateral sulcus of the frog was an obvious penetrant tract emitting a scanty purulent discharge. The hollow of the heel was swollen, but not fluctuating. The temperature was normal. Operation with the same technique as in the previous case. The wound healed uneventfully. A shoe was



dressings. Fever ($39.3^{\circ}\text{C}.$) was observed on the morning of arrival, and the horse, when examined, was very lame on the off-hind limb. The perforation lay in the outer collateral sulcus of the frog, but there was no discharge; the hollow of the heel was swollen. The following day the operation was carried out the usual technique being followed. Healing was uneventful for fourteen days, when an abscess appeared about the middle third of upper border of the outer cartilage of the third phalanx. Two days later an abscess opened at a corresponding site on the inner aspect of the limb. After being laid open to release thick glutinous pus which contained micrococci, some diploid and others in chains, the abscesses healed quickly with antiseptic irrigations. Six weeks after the operation he was examined when he trotted sound, and was shod with a flat shoe. Since then the patient has performed farm work.

CASE 6. HEAVY ARDENNER, 9 YEARS. The lameness when the horse was examined on the day of the accident was not marked. A

FIG. 2.—The deep flexor tendon from the level of the fetlock to its insertion. The superficial tissue has been removed to show: (a) the division of the lower part into two halves separated by a longitudinal furrow; (b) the more compact structure of the broad upper section apposed to the proximal sesamoid bones. Distal to this part the spiral formation of the fibres commences.

punctured wound was located about the middle of the medial collateral sulcus of the frog. The usual treatment was given, i.e. local paring of horn, irrigation with Tinctura Iodi and bandaging. The lameness increased

during the next ten days, little weight being placed upon the limb. There was no fever, no discharge, and no swelling in the hollow of the heel. The dressing was renewed. Two days later a purulent discharge mixed with synovia appeared; the hollow of the heel commenced to fill; still there was no fever. A probe was passed along the tract after superficial paring of the horn of the sole and frog; no perforation of the tendon could be demonstrated. An incision was carried backwards for a distance of 3 cms. from the wound and medial to this, a mass of digital cushion 3 cms. long and 1 cm. broad was excised. A probe was now inserted and followed the tract towards the mid-line and thence through the tendon on to the navicular bone. The bursa was irrigated with hydrogen peroxide, later with iodine, a gauze drain

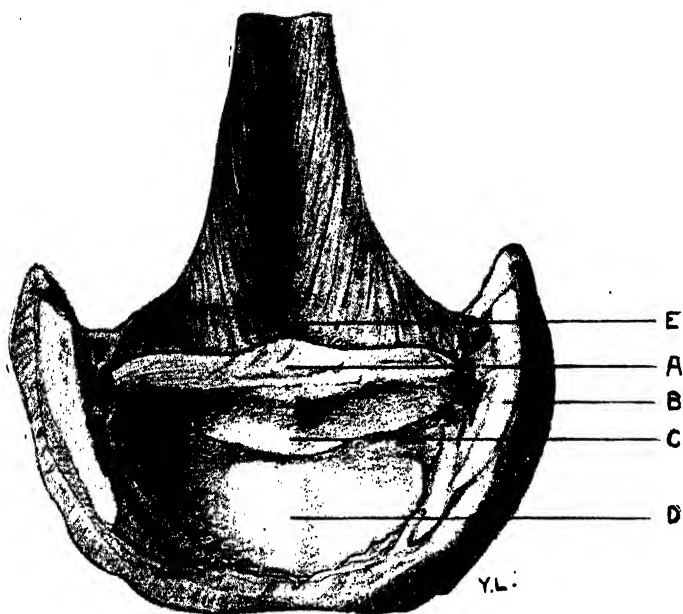


FIG. 3.—Shows the third phalanx D, distal sesamoid bone C, and the deep flexor tendon E, as viewed from above. The lateral cartilages are partially resected, their sectioned surfaces being indicated by B. A denotes the cut surface of the suspensory ligament of the sesamoid bone. Observe that the sesamoid bone is completely covered by the fan-like insertion of the deep flexor tendon.

was inserted and bandages applied. 100 ccs. anti-purpura hæmorrhagica serum (Jensen) were given intravenously and 150 ccs. intramuscularly. The dressings were renewed thrice in the succeeding fourteen days. Some suppuration was observed in the early stages, but later the field was quite dry, and additional 150 ccs. of the above serum were given intra-muscularly on the seventh day after the opera-

tion. The lameness had not diminished perceptibly whereupon the radical operation was proceeded with. A similar technique to that employed in previous cases was employed except that the incision into the digital cushion was made in the mid-line. The cartilage was removed with the specially constructed curette. The lameness diminished rapidly and the wound healed uneventfully. The limb was being used at the end of two weeks and when four weeks had passed a shoe with high caulkins and a metal sole was put on. There was no excessive scar formation and the patient was discharged. At this stage he could walk sound, but was lame at the trot. After two months in a loose box followed by ten days light exercise there was still lameness at the trot. The animal was put to grass; after two months a renewal of the lameness was remarked. Examination showed some bruising of the frog which was projecting below the level of the shoe. The condition responded to treatment and the animal commenced slow road work in Stockholm and later was worked at all paces, being restored to full usefulness and quite free from lameness at the trot:



FIG. 4.—Photograph of one half of that part of the deep flexor tendon normally apposed to the distal sesamoid bone. The blood vessels injected with Berlin Blue, are not well defined on the photograph. (a) Part of the tendon distal to the sesamoid bone; (b) The area of the tendon normally in contact with the sesamoid bone; (c) The highly vascular part of the proximal cul-de-sac of the navicular bursa.

CASE 7. HALF-LEGGED HORSE, 7 YEARS. This horse was transferred from the Ambulatory Clinique, where a nail-perforation of the near-hind foot had been diagnosed. An abscess had opened in the hollow of the heel; the usual treatment together with the injection of 200 ccs. of "anti-wound infection serum" had been carried out. With no improvement in the lameness the case had been remitted to the Surgical Clinique. On examination the lameness was very marked; the coronet of the affected foot was diffusely swollen with a serous discharge

from an opening on the lateral aspect just proximal to the coronary band. A diagnostic operation was performed the next day. After paring the horn, the frog was incised in the mid-line and with a probe the tract was followed through a perforation in the tendon; the

aperture was enlarged slightly and the bursa irrigated with hydrogen peroxide, drained and bandaged; after three weeks, with several changes of dressings both the coronary abscess and the operation wound had healed satisfactorily. The lameness had diminished slightly, suggesting that the distal interphalangeal joint was not implicated. A radical operation was undertaken with a similar technique to that employed in Case 6. Whilst curetting the cartilage several strong adhesions between the navicular bone and tendon were encountered. Improvement was seen after three days. And at the end of a week the animal could walk in the box without much disability. The bandage was changed on the twelfth day when the wound was healing by healthy granulation. A shoe with high caulkins and a sole were applied twenty-two days after the operation; at this stage the patient walked



FIG. 5.—Curette for the removal of the cartilage on flexor surface of the distal sesamoid bone.

sound but was slightly lame at the trot. He was discharged ten days later, and walked the return journey of ten kilometres. He was examined again after a further two months, during which time he had worked but had shown some lameness with heavy loads. When seen he was sound both at the walk and the trot; the transient lameness remarked by the owner appeared to have been due to that no new shoes had been fitted since the horse left the College and the toes were

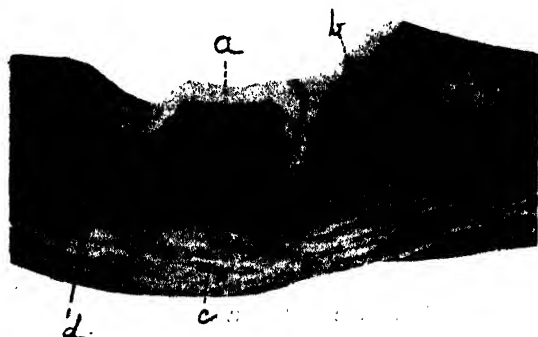


FIG. 6.—Sagittal section through the distal interphalangeal joint with spontaneous obliteration of the navicular bursa after traumatic perforation (case reported by Hederstedt). (a) sesamoid bone; (b) third phalanx; (c) tissue binding the deep flexor tendon to the sesamoid bone; (d) new bony tissue. The horse moved without the slightest lameness.

overgrown. Subsequently the horse performed work at a fast pace for seven years without any lameness whatever.

CASE 8. BIG ARDENNER, 8 YEARS. This horse had sustained a nail prick in the near hind hoof, and no weight was being placed on the limb. An exploratory operation with enlargement of the tract demonstrated a bursal perforation and the radical operation with a mid-line incision was carried out, when the bone was found to be devoid of cartilage. The bursa was irrigated and drained. A streptococcal pus was present when the bandages were changed on the third day and no weight was being put on the limb. Three weeks after the operation the animal commenced to use the leg. On the twenty-second day there was a sudden relapse with an exacerbation of the lameness. This was due to pus-retention and responded to appropriate treatment. He was shod on the thirty-seventh day succeeding the operation and five days later was sound at the walk and was discharged. The patient was seen, by request, one year after the accident. At first he had been spared and put to grass but more recently had done several months work. There was neither lameness nor reaction to the "flexion test."*



FIG. 7.—Sagittal section through the distal interphalangeal joint after the operation described in this article. (a) distal sesamoid bone; (b) part of the deep flexor tendon running to its insertion into the third phalanx. Lameness reappeared after the animal had returned to work for four months. The cause would appear to be the exterior bony enlargement over the posterior face of the sesamoid bone which caused pressure upon the tendon and digital cushion.

In addition to the above cases I have operated on some ten others the majority of which were restored to full usefulness. Some less favourable or definitely unsuccessful cases remain for discussion. One horse became lame after working for three or four months, and never recovered. On *post-mortem* the navicular bone was found to be grossly

* In Stockholm this test is a routine measure in the investigation of lameness; it is designed to show the effect on a given lameness, of sustained flexion of a joint or series of joints.

enlarged from ostitic changes and constituted an obvious cause of the disability. In one case necrosis of the tendon led to its rupture immediately behind the navicular bone. In two remaining cases the distal interphalangeal joint shared in the septic process and in one of these infection of the digital sheath supervened.

To those who would employ this method, early surgical intervention is urged; for whilst one waits a long time for results there is every hope of a complete elimination of lameness. Moreover, the light work which the subject can undertake a few months after the operation, helps to defray the cost and makes the procedure an economical proposition.

BIBLIOGRAPHY.

- André, *Annales Médecine Vétérinaire*, sid 137, Bruxelles, 1853.
 Cadiot et Almy, *Traité de Thérapeutique Chirurgicale*, Paris, 1904.
 Degive, *Précis de Médecine Opératoire Vétérinaire*, Bruxelles, 1908.
 Dieterichs, *Handbuc der Veterinair-Chirurgie*, Berlin, 1836.
 Eberlein, *Die Hufkrankheiten des Pferdes* (Bayer-Fröhner, *Handbuch der Chirurgie*), Vienna u. Leipzig, 1907.
 Frick, *Tiërarztliche Operationslehre*, Berlin, 1923.
 Gutenäcker, *Die Hufkrankheiten des Pferdes*, Stuttgart, 1901.
 J. Hederstedt, s.r., *Behandling av spiktramp med öppen bursa*, Sv. Veterinärtidsskrift, 1907, sid 513.
 Hertwig *Praktisches Handbuch der Chirurgie für Tierärzte*, Berlin, 1859.
 Merillat, *Vétérinary Surgery*, Chicago, 1918.
 Möller, *Lehrbuch der Chirurgie für Tierärzte*, II Band, Stuttgart, 1908.
 Mörkeberg, *Fodens Sygdome*, (Supplementbind II til H.V. Stockfleths Haandbog i Veterinaerkirurgien), Copenhagen, 1900.
 Nocard, *Archives Vétérinaires*, sid 841, Paris, 1879.
 Pfeiffer, *Monatsheft für praktische Tierheilkunde*, Band 7, sid 433, Berlin 1897.
 Röder, *Chirurgische Operationstechnik für Tierärzte*, Berlin, 1922.
 Sendra l, *Chirurgie du Pied* (Encyclopédie Cadéac), Paris, 1903.
 Schmidt, *Operationslehre* (Bayer-Fröhner, *Handbuch der Chirurgie*), Vienna u. Leipzig, 1923.
 Vennerholm, *Spezielle Operationslehre des Pferdes*, Stuttgart, 1907.
 Williams, *Surgical and Obstetrical Operations*, Ithaca, 1903.

The nomenclature adopted by Sisson in "The Anatomy of the Domestic Animals" (W. B. Saunders & Co., Philadelphia) has been used throughout the translation. Owing to the multiplicity of veterinary anatomical terms at present in use, the following list of synonyms has been appended.—[TRANSLATOR.

- | | | | | |
|----|-----|---|---------|-------|
| 1. | (a) | Cartilages of the third phalanx (CARTILAGINES PHALANGIS TERTIAE) | .. .. . | Sx |
| | (b) | Lateral cartilages of the foot | .. .. . | McFxx |
| 2. | (a) | Collateral sesamoidean or suspensory navicular ligaments. (Lig. sesamoideum collaterale ulnare, radiale.) | .. .. . | S |
| | (b) | Postero-Lateral ligaments | .. .. . | McF |
| 3. | (a) | Collateral sulci of the frog (SULCI PARACUNEATI) | .. .. . | S |
| | (b) | Cruro-parietal grooves | .. .. . | Bxxx |
| | (c) | Lateral lacunae of the frog | .. .. . | McF |
| 4. | (a) | Corium of the frog (CORIUM CUNEATUM) | .. .. . | S |
| | (b) | Cuneate matrix | .. .. . | B |
| | (c) | Sensitive frog | .. .. . | McF |
| 5. | (a) | Deep flexor tendon | .. .. . | S |
| | (b) | Flexor perforans tendon | .. .. . | McF |
| 6. | (a) | Digital cushion (TORUS DIGITALIS) | .. .. . | S |
| | (b) | Digital Torus | .. .. . | B |
| | (c) | Plantar cushion | .. .. . | McF |

7.	(a)	Digital Sheath (VAGINA DIGITALIS)	B
	(b)	Synovial sheath of the flexor tendons	McF
	(c)	Metacarpo-phalangeal sheath	
8.	(a)	Distal interphalangeal articulation (ARTICULATIO INTER-PHALANGEA DISTALIS)	S
	(b)	Coffin joint	
	(c)	Pedal joint	
9.	(a)	Distal sesamoid bone (OS SESAMOIDEUM PHALANGIS TERTIAE)	S
	(b)	Sesamoid bone of the third phalanx	B
	(c)	Navicular bone	McF
10.	(a)	Navicular bursa (BURSA PODOTROCHLEARIS)	S
	(b)	Synovial sheath of the deep flexor tendon	B
	(c)	Navicular or small sesamoid sheath	McF
11.	(a)	Phalango-sesamoid ligament	
		Distal navicular ligament (LIG. PHALANGEO-SESAMOID-EUM)	S
	(b)	Interosseous ligament	McF
12.	(a)	Proximal sesamoid bones (OSSA SESAMOIDEA PHALANGIS PRIMAE)	S
	(b)	Sesamoid bones of the first phalanx	B
	(c)	Sesamoid bones	McF
13.	(a)	Third Phalanx (PHALANX TERTIA)	S
	(b)	"Os pedis" or "coffin bone"	S

X Sisson, S., "The Anatomy of the Domestic Animals" (V.S.).

XX McFadyean, Sir J., "The Comparative Anatomy of the Domesticated Animals," H. K. Lewis, London.

XX McFadyean, Sir J., "The Anatomy of the Horse," W. & A. K. Johnston, Ltd., Edinburgh.

XXX Bradley, O. C., "The Topographical Anatomy of the Limbs of the Horse," W. Green & Son, Edinburgh.

Clinical Articles

Hydrotherapy in Hyperpyrexia.

By DAVID ERIC WILKINSON, M.R.C.V.S.

DURING the short spell of hot weather in July, 1927, I was asked to attend a Shire gelding reported to be "off his feed."

He was one of a small stud of horses belonging to a coal merchant who is an excellent horse-keeper and was, in common with the rest of the stud in very good working condition.

I found his skin cold and dry, mouth and tongue dry and hot, bowels and kidneys torpid and anorexia complete, as he even declined to drink water. The temperature was 108° F., at which point it remained stationary for four days. During the whole of that time the horse never ate a particle of food nor did he drink any water.

When water was offered to him he merely put his muzzle in it and splashed it about.

The treatment consisted of the administration of one drachm of calomel twice daily, with frequent and vigorous grooming, and the dissolving in the drinking water of artificial Carlsbad salts. As the animal never drank anything this was of course wasted. On the morning of the second day, as all glandular secretions appeared to be in abeyance a hypodermic injection of arecoline compound was given, with very little result. There was some slight salivation, and a few pellets of fæces, covered with mucus were passed but the patient's general condition remained the same. An attempt was made to administer a few doses of liq. ammoniæ acetatis and spts. ætheris nit. as drenches but had to be abandoned as the animal was dangerous to drench.

I therefore made up some balls containing sodii salicylas of which I prescribed four drachms night and morning without having any effect on the temperature.

Having seen a similar case die of super-purgation after the administration of an aloetic physic ball, many years ago, I hesitated to adopt any drastic measures although the icteric condition of the visible mucous membranes began to call for some vigorous bowel and liver stimulant.

On the evening of the fourth day of treatment I took the stomach pump and tube, and injected three gallons of water from the tank in the stable yard (which had been well aerated and warmed by the sun) by the nasal route, dissolving in this 84 grains of Dimol as an intestinal antiseptic.

On the following morning the temperature had fallen to 102.5°, the horse had eaten a hot mash, his bowels had acted, evacuating a large soft mass of fæces resembling a cow's, and his general condition had greatly improved. The skin was warm and the mouth moist and clean. In the evening the temperature had fallen another degree, and from that time his progress was uninterrupted and no further treatment was adopted.

I am quite unable to account for the symptoms. This was an apparently healthy horse, which had been in the stud for five years and had given no trouble. He had been in regular daily work and there was no sickness amongst the other horses.

A Case of Poisoning by Water Dropwort in Cattle.

By F. BOOTH, M.R.C.V.S.,

Old Colwyn.

CALLLED on July 2nd, 1929, to see 5 cows at a dairy farm near Colwyn Bay, at 8 p.m. My son attended and found the 5 cows looking very depressed, purging freely, off food, extremities cold, temperatures

varied from 102 F. to 105 F., pulse frequent and thready, all seemed to suffer from abdominal pain and grunted.

The history given by the owner was that he noticed the cows running about in the field, some were very excited and wild, the weather was very hot at the time and he put their condition down to the heat, they were all driven to the buildings, where there was some shelter. At milking time in the afternoon 5 of the cows were off their milk, trembling and in obvious pain, they were kept in and as they went worse, began to purge, etc., we were sent for.

Diagnosis, vegetable poison was suspected, but owner was unable to give any help in the matter, he said that the pastures were very bare owing to the drought and nothing of a poisonous nature, that he knew of, grew within the cows' reach.

Treatment, each cow was given a saline purge.

July 3rd, at 9 a.m., two of the cows were trembling at the flanks, bodies cold, temperatures 105 F., the other three seemed easier, temperatures 102 to 103 F., extremities cold, all were dull and off food and drink, no milk, they moved with difficulty and appeared to be partially paralysed, ext. nux. vom. and ammonia given.

At 7 p.m. four were down and would not get up, two of them, the ones with trembling flanks in the morning, were nearly comatose, two other cows had become affected by now and they were given a purge, the cows that were down were given a hypodermic injection of strychnine and the one that was up another dose of ext. nux. vom. and ammonia.

The owner was asked to look over the ground well to see if he could find any poisonous plant.

July 4th, seven cows in much the same condition as yesterday, but two of those that were down last night were able to get up, their bodies were warm and they looked brighter, the two that remained down were comatose, bodies cold and temperature per rectum sub normal, the five that were up took no food or drink and they were all very dull. The nux. vom. and ammonia were continued to those standing and the other two were given strychnine hyperdermically.

The owner was asked if he had found any poisonous plant in the pastures and he said no, so we went with him over the ground and found that the cows had broken over into a marshy coppice in which a good crop of water dropwort (*Eanthe fistulosa*) grew, the cows had eaten a large quantity of the flowering tops and leaves and a lot had been pulled up by the roots, but none of the roots seemed to have been eaten.

This explained all the symptoms, but I had never seen a case of poisoning from eating the flowering tops and leaves before although I

had previously seen lambs and cattle poisoned from eating the roots.

July 5th, one of the cows down yesterday found dead and the other cold and worse in every way, the other five much better, three taking a little food and drink, treatment continued.

Post-mortem on dead cow revealed all stomachs practically empty and very much inflamed, small bowel slightly inflamed.

July 6th, the other cow that was down yesterday was dead and *post-mortem* was same as other cow but more marked. The other five improving nicely and from this day on they improved gradually until completely recovered.

A noticeable feature was that before a cow went down her body became very cold and her flanks trembled, when down they were partially comatose and those that died became quite comatose and never recovered. In those cows that recovered improvement started as soon as their bodies got warm and they continued to improve so long as they could be kept warm, but the body temperature went up and down intermittently and in the case of the two that died we were never able to get them warm.

A Case of Tuberculosis in the Horse.

By J. McCUNN, M.R.C.V.S., M.R.C.S., L.R.C.P.,

Professor in the Royal Veterinary College, London.

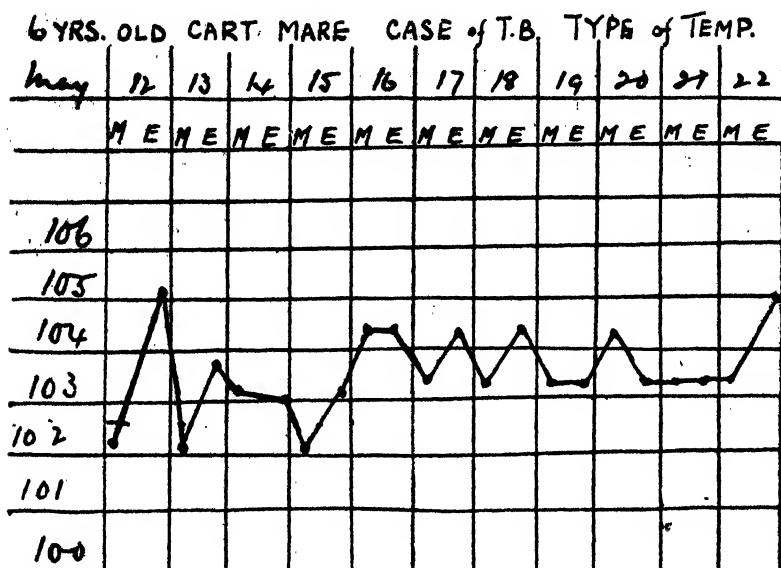
The following is a case which, on account of its course, I think worthy of a record.

The patient was a six years old cart mare, bred and born on the farm where she died, owned only by one man. All her working life she was worked by the same individual. On Sunday, 15th of April, I was asked to look at this mare. She had been on and off her food for about a month or six weeks. She had lost flesh and it was surmised that her teeth were causing the trouble.

The mare, when seen, had been turned out for the week end. She was in the field with the others and was grazing. She looked bright and apparently healthy. Her coat was in good order and I naturally thought that the owner's suspicions *re* her teeth were well founded. Examination of the mouth revealed sharp edges on the teeth and nothing else. They were rasped. On handling the mare it was noticed that she felt hot, and on taking her temperature I was surprised to find that it was 105.5 Her respirations were normal in rate and type, but on auscultation moist sounds were heard along the sternal region. The mare was housed, mustard applied and the usual feluluge mixtures

given. In two days the mare was feeding fairly well, the temperature had fallen to 102.5 and the case looked like clearing up.

A few days later the owner reported that the temperature had again gone up to 105 and that there was fairly profuse diarrhoea. From now until death the temperature rose and fell, and there was intermittent diarrhoea.



At various periods during the course of the illness the mucous membranes showed a slight dirty yellow colour, they were never deeply injected as one would have expected considering the temperatures that were shown. The skin was flushed and moist most of the time. Urine was voided frequently and in great quantities, the straw of the box being continually saturated. There was no stiffness apparent either in the neck or limbs and she took her rest well. Tubercle or some septic condition was suspected but no test was applied on account of the high temperatures that were run. The animal died on May 27th.

On *post-mortem* examination the liver was found to be a mass of tubercles. It would have been difficult to lay half-a-crown on the liver without touching a tubercle. They varied in size between that of a small orange and a pea.

The substance of the liver was also filled with them. The spleen showed nodules some two or three being the size of a large orange. There were lesions in both pulmonary apical lobes with abscess formation. The bronchial, mesenteric, aortic, and iliac, glands were affected. The neck bones were apparently clear but the bodies of the

thoracic and lumbar vertebræ showed great enlargement with erosion and anchylosis.

As far as we could ascertain there had not been a previous case in a horse on the farm. The animal had never had cow's milk as a food. A herd of cows was kept on the farm. Could this case have been one of infection from contaminated pasture or direct infection?

An Abnormal Urinary Bladder.

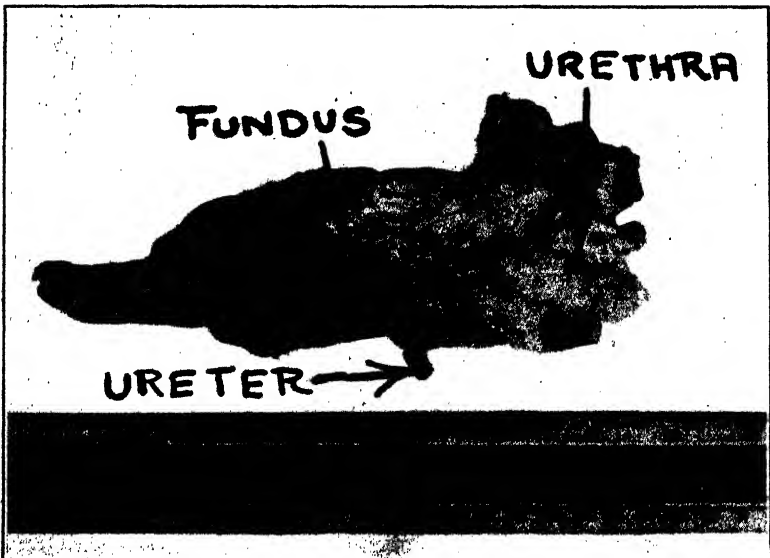
By R. J. FOREMAN, M.R.C.V.S.,

Tottenham.

SUBJECT was a three-quarter legged cart horse.

HISTORY.—Had been at work in a firm for about nine years. It had never been ill. There had been no trouble with its water.

I was called in to see this animal as it was off its food. The usual measures were taken. It developed an acute muco enteritis and death



took place four days after my first visit. The animal did not pass urine during its few days of illness, but I was able to elicit that small quantities of urine pus like in appearance had been passed for about a fortnight before death.

Post-mortem showed acute muco-enteritis. The heart and lungs were normal. The bladder was difficult to find. It was very small.

Its mucous membrane appeared to be normal. Its fluid contents were negligible. The left kidney was normal in size and showed some degree of pyelonephritis. The right kidney was not quite of normal size and it was also affected with pyelonephritis.

The case is interesting in that the horse could exist apparently normally with such a small urinary bladder.

I am indebted to Mr. J. W. H. Holmes, D.V.S.M., of the Royal Veterinary College, for the admirable illustration.

Translations

A Case of Chronic Metritis with Pyometra; Incision of the Neck of the Uterus and Fatal Hæmorrhage.*

By VETERINARY COMMANDANT DARROU.

THE cure of chronic metritis where the uterine neck is closed and pyometra exists is considered doubtful by the classic authors. In bovines Moussu advises "sacrifice the subject or leave it to the defensive resources of its organism." In the mare the malady is quite rare. Among the remounts we had an old mare suffering from the chronic form of the disease. She was bought at eight years old and was called "Follette," and nothing was known of her previous gestations and the sequelæ of them. But her career as a brood mare had been interrupted by an accident producing sterility and so she was sold.

On arrival on December 1st, 1925, she was in bad condition and feverish, and not improving, came into hospital on December 30th. The genital organs being examined, there was slight leucorrhœa, vulva just soiled, at intervals bad smelling discharges, but most marked polakiuria characterised by expulsive efforts without result. Rectal exploration showed a very large and distended uterus up to the horns, giving a very plain sensation of fluctuation analogous to that of a gravid uterus. Vaginal exploration showed total closure of the uterine neck, the finger penetrating only one centimetre and beyond complete atresia.

Attempts to pass sounds or cannulas on January 20th were unsuccessful and we came to the conclusion that we had a chronic metritis to deal with and pyometra due to closure of the neck of the uterus and a cavity cultivating deleterious microbes.

* Bulletin de l'Académie Vétérinaire, de France.

There was now noticed marked emaciation and alopecia in different parts of the body, but appetite remained almost normal. On March 17th we decided to operate and used a bistouri wrapped at its base with cotton, no ovariometer with a hidden blade being available. The incision was made into the expansion of the neck of the uterus, but there was no fixing of the point of incision and no precise direction, owing to the hand only being used. No pus escaped after the incision, showing that the uterus had not been punctured. In 40 minutes the mare fell and died from internal hæmorrhage. Autopsy showed that the incision had been made below the neck and had severed collateral branches of the vaginal artery. On opening the abdominal cavity the uterus showed a greenish tint and on incision a purulent greyish yellow liquid escaped, with a putrid odour and containing mucous filaments. About five litres or a gallon of fluid came away. The uterine mucosa was thickened, ulcerated and showed chronic maceration. These lesions involved the epithelium and glandular tissue which had a downy aspect as a result of hypertrophy. The neck at the uterine side had a very tiny opening which went in an angular direction, hence the difficulty of penetrating the os and the almost total absence of leucorrhœa and just below this opening we found the incision made by the bistouri. Intervention was necessary, the mare was useless, but our technical chiefs judged the intervention as unfortunate and involving a fault in operation. The hæmorrhage was a surprise to us and we did not think that the vascularisation of this region would involve such a hæmorrhage.

It was then that we made an appeal to Professor Bourdelle, who gives the following on the circulation of this region.

The circulation of the uterine neck is bounded on each side by the uterine and vaginal artery and chiefly by this latter in the mare at any rate; the terminal branches of these arteries anastomosing not exactly at the level of the neck, but on the body of the uterus. These branches form in every case a system of a plexuous nature, situated in a lateral position, but thrown out a little above and below. The two lateral systems anastomose above and below by transverse branches of smaller dimensions. This system remains quite superficial at the level of the os "which finds itself thus surrounded by vessels when the body of it is penetrated" (Farabeuf). It only hinders numerous divisions of reduced calibre from penetrating the thickness of the muscularis and mucosa of the neck. And Bourdelle concludes that incision of the neck remains as the classic veterinary obstetricians (Violet and St. Cyr, Bournay and Robin) remark concerning vaginal hysterectomy, a bloody operation. St. Cyr estimates 30 per cent. of fatalities.

The surgeons have debated and discussed much about the number, the position, the depth of the incisions to make and M. Bourdelle states that if one attempts the operation one should practise multiple superficial incisions and try to give most importance to superior and inferior median incisions.

En résumé in the case under discussion, the impossibility of catheterism, the complete atresia of the os justified the only possible surgical intervention. The point of the incision at one centimetre below the cicatricial centre of the neck of the uterus was quite one of least danger from a blood supply point of view. There was therefore no operatory fault. Employed as an ultimate resource and only in cases where dilation is impossible this operation may perhaps be tried.

M. Cocu suggested that an electrifiable olive on an isolated handle and bound to a negative pole with a continuous current of 10 to 15 milliamperes would appear to be an effective method of operating without danger.

M. Moussu, commenting on this case, says he would have preferred a sterilised trocar and inserted it following the normal direction of the cervical canal.

Some Attempts to Obtain, by Means of Physiological Experiments, an Objective Basis for an Opinion as to the Cruelty Alleged to be Attendant on the Jewish Ritual Method of Slaughtering Cattle.*

By PROFESSOR A. V. SAHLSTEDT.

Principal of the Veterinary Institute, Stockholm.

THE general interest attached to the ritual method of slaughtering cattle employed by the Jews (schechita)—an account of its supposed cruelty—has led to lively discussions, where, on the one side physiological points of view were emphasised, and, on the other, laymen's supersensitive sympathy for animals became apparent. As, of course, the subjective reaction to pain on the part of animals has hitherto been and, probably, always will, remain hidden from our judgment, we have been obliged, in the discussions respecting various methods of slaughtering cattle—as far as the question of protecting the animals from unnecessary cruelty was concerned—to investigate the testimony borne by our observation of certain physiological

* Abstract from 3 Nordiske, Veterindermote, Oslo, 11, Juli, 1928.

phenomena, the blood pressure, the movements of the animals, etc. By these means, and by comparison with corresponding conditions in the case of human beings, endeavours have been made to draw deductions respecting the presence or absence of consciousness, i.e. the condition of conscious sensation of pain in the animals slaughtered. To be able to contribute to such objectively determinable facts as might serve as guides to our judgment in such cases, the writer has carried out certain experiments on cows in connection with the Jewish methods of slaughtering. These experiments form a part of the investigation made by the Professors' College of the Veterinary Institute in Stockholm on account of a proposal for a Slaughtering Bill placed before the Swedish Parliament in 1925.

(1) By measuring the area of the vessels which convey blood to the brain it has been found that the amount of blood, which via art. vertebrales is normally carried to the brain, amounts to $1/5$ to $1/6$ of the total blood supply to that organ.

(2) By experiments with a "Stromuhr" placed in one of the art. vertebralis it has been found that the amount of blood passing through these arteries during the course of the first 20 seconds after the "schechita" cut has been made falls to about $1/6$ of the amount which passed before, so that the total supply of blood to the brain should, in the same time, fall to $1/30$ to $1/40$ of the normal amount.

(3) By collecting and measuring the blood which escaped from the large vessels of the neck after the cut, at periods of half or one minute in duration, it has been found that the bleeding, under normal circumstances, is so rapid that, after half a minute, 33 per cent.; after one minute, 50 per cent.; after one and a half minute, 63 per cent.; after two minutes, 70 per cent.; after three minutes, 83 per cent.; after four minutes, 90 per cent.; and, after five minutes, 95 per cent.; of the total amount of the blood which runs away, has been carried off.

(4) A blood-pressure experiment, carried out with the venous blood in sin. sagittalis of a cow, gave, after the cut, a slow lowering down to 0, which lasted about six and a half minutes. The seeming want of agreement between this experiment on one side, and on the others the writer's bleeding experiments and test respecting the speed of the blood-current in art. vertebrales, and some experiments respecting the arterial blood pressure and the intracranial pressure, carried out by Lieben, may probably be explained as resulting from local vaso-motor effects.

On comparing the results obtained by the writer's own tests and by Lieben's, the writer has arrived at the conclusion that, in normal procedure, the Jewish method of slaughtering is probably rapidly

followed by loss of consciousness, and that, consequently, this method cannot be said to be attended by "cruelty" to the cattle. But, in consequence of the disposition of cows' blood to coagulate rapidly, there can ensue, after the cut, and that rather quickly, a closing of the large blood vessels of the neck, so that one ought to take into account the possibility that, during the first few minutes after the cut, the blood pressure may be maintained at such a level that the brain will still receive the amount of blood necessary for consciousness. If in a possible future Slaughtering Bill an exception be made in favour of the Jewish method, excusing those employing it from rendering cattle unconscious by means of shooting or stunning on the forehead before bleeding, then the writer considers it best, as a protective measure against needless suffering on the part of the cattle, that the regulation should be added to the Act that this latter procedure must be carried out immediately after cutting, as a guarantee that the slaughtered cattle have, after all, been killed as painlessly as possible.

An Enzygotic Twin.

By G. NAIR, G.B.V.C.,

Veterinary College, Calcutta.

THE photograph shown in this article illustrates a hill she-buffalo of about 8 years, and her fourth offspring, which she gave birth to during the calving season of 1929 of this country, and her owner supporting this curious monster with his right hand. Unaided though the parturition was, yet no untoward result occurred excepting the slight post-partum hæmorrhage, and the partial unconsciousness about a couple of hours. A dose of rum was then administered to her after which she recovered consciousness and began to lick her strange calf. That was all the medication it had. She is quite healthy and gives about 14 seers of milk even now.

The External View.

The monster had a pair of separate heads with all the sensory organs, two distinct well defined necks, behind each of which a pair of forelimbs, one hindlimb and a tail for each part of the body on one side; on the upper part of the body above the tails it had a common hindlimb—the sickle-shaped limb which caused obstruction and hæmorrhage at the time of delivery—and just below the two tails a single anal opening, lower down the anus an ill-defined vaginal opening with a minute hole through which urine dribbled in the act of micturition.

History of its Short Life.

It made repeated attempts in vain to rise. The limbs never worked in harmony in spite of its united body ; and even if it were made to stand up it could not maintain that position unsupported because of its disarranged location of the limbs. It never fed from the mother and hence was spoon-fed on milk through both the mouths. On the third day it refused feed and showed marked straining to



defæcate but all its efforts were in vain. Late in the evening it was found slightly blown up and in distress. Before it could get any professional aid it died part by part and ended its short life of three days. That part of the monster near to the forelimb of the mother—as shown in the illustration—was the one which was born first and it was the same one which expired first.

Internal Appearance.

There were two well-defined thoracic cavities containing heart, lung, etc. The abdominal cavity was more or less one though it contained all the viscera of two separate animals with the only difference that one set of organs was not so developed as the other. The remarkable anatomical features were to be found in the pelvis which itself was very peculiar. Though there was only one developed pelvic cavity

there was another one which was fused with the former or rather adhering to it on one side. As I was not able to examine the skeleton the osteological peculiarities still remain dark to me. The generative system was completely undeveloped. The terminal part of the floating colons of the two intestines opened into the single rectum by a very narrow opening where there was faecal obstruction.

Discussion.

This faecal obstruction, together with the over-feeding and over nursing might be the probable cause of its early death. If there was any timely veterinary assistance probably the life of this queer buffalo-calf could have been saved or at least prolonged for a few days.

In human embryology a variety of monochorionic foetuses are described out of which the most interesting is Omphaloangiopagus twins which are united only by means of vessels of the umbilical chords in the single placenta. Another thing worth noting about such beings are that both twins are generally of the same sex and one of which will be of normal structure and the other is of a deformed nature. Very seldom do we come across a monochorionic twin in lower animals. If similar terms can be applied to lower animals the subject of this article, I should say is an Enzygotic Twin, i.e. twin developed from the same fertilised ovum. The explanation for this kind of enzygotic twin would appear to be that the ovum might have given access to a pair of spermatozoa instead of a single one.

In this connection it would be worth while to note what authorities on the subject say about this kind of abnormality:—

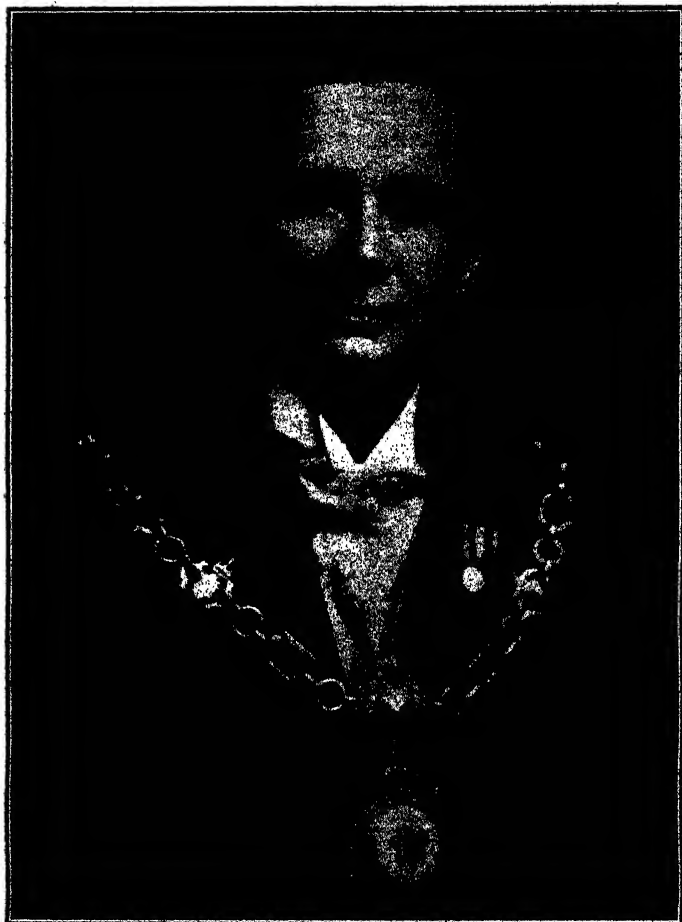
Ballantyne in his Antenatal Pathology and Hygiene says that uni-ovular twins may be perhaps due to the presence of two germinal vesicles present in a single ovum or to the penetration of an ovum by a pair of spermatozoa.

The interesting point about this freak is centered round the unequal development of the body and the peculiarities noted in the pelvis.

In the embryonic life the relative values of differences in foetal position are worth studying. The Teratogenesis of Enzygotic Twins is open to canons of criticism in how much the twinship is responsible for allowing the deformed development of the foetus or how much the deformity is due to twinship. At any rate it is interesting to note its short existence of three days in the external world in lieu of the antenatal death common to such enzygotic twins.

Personal

MR. R. B. H. MURRAY, M.R.C.V.S., D.V., S.M., has been appointed a Veterinary Officer in Uganda.



COUNCILLOR WILLIAM TEMPEST OLVER, J.P., M.R.C.V.S.
Mayor of Tamworth.

THE VETERINARY JOURNAL

Editor :

FREDERICK HOBDAV, C.M.G., F.R.C.V.S., F.R.S.E.,
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Sub-Editor :

GLADSTONE MAYALL, M.R.C.V.S.

DECEMBER, 1929.

Biography

WILLIAM TEMPEST OLVER, J.P., M.R.C.V.S.

It is good for our profession that its members shall take interest in municipal affairs, and the subject of our biographical note is, in particular, an example of one whose family has done its duty in this respect ; as his father and grandfather had each occupied the Mayoral Chair.

As the son of the late Mr. Harry Olver, F.R.C.V.S., whose name as an Examiner was so well known and beloved by scores of veterinary graduates, Councillor William Tempest Olver commenced his career in the profession under very favourable auspices. By the wish of his father he entered the London Veterinary College immediately upon leaving School, taking his diploma in 1901 after a highly creditable student career.

This was the time of the South African War and, under the ægis of the Army Veterinary Corps, Mr. Olver joined up to help.

In 1902 he joined his father in private practice and, upon this popular gentleman's much regretted death in 1903, he took over the responsibility of a very large *clientele*, the duties of which included two Veterinary Inspectorships in the Counties of Staffordshire and Warwick.

In 1920 he was first elected to the Town Council and since then he has occupied numerous municipal positions of responsibility, positions in which he has had the opportunity of proving his worth. That he has succeeded is shown by the fact that he has now been unanimously selected to fulfil the position of Chief Magistrate of one of the most ancient boroughs of Great Britain ; a proud position on which we of the veterinary profession who are his colleagues send him our congratulations, and wish that he may have that good health and prosperity, which are so essential for the carrying out of such onerous duties as fall on one who occupies the combined positions of Mayor and Chief Magistrate.

Editorials

**A SPECIAL CHAIR OF CANINE MEDICINE
FOR THE LONDON COLLEGE.**

SPECIALISM has now become as well established in veterinary practice as in the human side of medicine, and the veterinary graduate of to-day finds that it not only pays him financially to concentrate on one class of patient, or one class of work, but that he is also rewarded a thousand-fold by the increased knowledge he acquires and the consequent increased interest which unconsciously comes into his daily life.

The cult of the dog has been not only the fashion, but also a source of extreme pleasure, for many years, to many people, and the veterinary profession, as a whole, has been slow to recognise their part in this.

To the few who, either from a natural liking for this class of work, or because they saw the prospects, seized the opportunity, canine

practice led the way to a good livelihood; and, in some cases, a fortune.

At last there is a movement to help the study of the diseases of the dog at the fountain head—i.e. the teaching schools—and by the kind help of certain dog lovers, foremost amongst whom are Mr. Sidney T. Lethbridge, the Managing Director of Spratts, Limited, and Capt. Hobbs, the energetic organiser of "The Tail-Waggers' Club," the sum of £20,000 was recently handed over to the custody of Sir Merrik Burrell, Bart.,



Capt. H. E. Hobbs.

C.B.E., the Chairman of the Governors of the Royal Veterinary College, London, towards the endowment of a special Chair of Canine Medicine and Surgery: to be devoted entirely to the study of the ailments of dogs and for the relief of canine suffering. The greater part of this sum was obtained from "The Tail-Waggers' Club," an organisation

which owes its success to the extraordinary energy and wonderful organising power of its Secretary, Capt. Hobbs.

"The Tail-Waggers' Club" is an organisation which was only started at the latter end of 1928; and within the short space of time of some 13 or 14 months, has already reached the huge total of over a quarter of a million members. All dogs are eligible, and the joining subscription (which is only 2/-), after a deduction of a small proportion to cover office expenses, goes to further some canine project which tends to alleviate animal suffering. During the year which has just passed these funds have been allotted towards the establishment, as mentioned above, of a Chair of Canine Medicine and Surgery. This money will be devoted entirely to the teaching of the modern methods of treatment of Canine Ailments and the alleviation of Canine suffering.

The object is a good one and, as it includes work which will benefit the profession, it behoves the individual members of the profession to play their respective parts, and to reciprocate the generous sympathy and help which has been accorded as the result of the S.O.S. which the Royal Veterinary College issued a short time ago.

ANOTHER GENEROUS GIFT TO THE ROYAL VETERINARY COLLEGE.

By the generosity of Messrs. Jesse Boot & Son, the well-known Chemists, the sum of £350 has been promised annually for at least three years, towards the expenses of the Chair of Pharmacology and Therapeutics in the Royal Veterinary College.

Such gifts are appreciated, not only by the College, which is doing its best under great difficulties to carry on its duties until the response of the Government to the urgent Report of the Parliamentary Inquiry Committee is known; but also by the profession, so many of whom revere the London College as their Alma Mater.

General Articles

CANINE HYSTERIA IN LUNDS, 1929.

By R. A. SCOTT MACFIE, M.A., B.Sc.,

Lunds, Sedbergh, Yorkshire.

LUNDS is a mountainous district of small, widely separated sheep and dairy farms, situated near Hawes Junction (L.M.S. main line) at the head of three valleys : Wensleydale (North Riding of Yorkshire, running down to Leyburn and Northallerton), Garsdale (West Riding of Yorkshire, running down to Sedbergh), and Mallerstang (West-morland, running down to Kirkby Stephen). There are also smaller dales in the neighbourhood, very remote and isolated, such as Cotterdale, Mossdale and Grizedale ; and Swaledale is not far distant.

"Canine hysteria" or "fright disease" as it is called in America, is said to have been prevalent at the lower end of Wensleydale a year ago, and in Swaledale. It reached Lunds late, about hay-time (July), 1929, and was recognized by the farmers as a new disease ; but dogs belonging to the fell-shepherd, who lives in Mallerstang, were affected in April, although the other farms in Mallerstang are still (November) free from the disorder. It was epidemic in Widdale and the neighbourhood of Hawes soon after it appeared in Lunds. Cases have occurred in Cotterdale, but the disease has not yet reached Garsdale, though there is said to have been one case in Grizedale.

If canine hysteria is infectious, the fell-shepherd, though he does not live in Lunds, has exceptional opportunities for spreading it, and the history of his dogs is therefore of interest in connection with our epidemic. In December, 1928, or January, 1929, one of them had three fits in a day and died during the following night. These fits, however, had none of the characteristics of hysteria. During the spring of 1929 he kept four dogs, two of which began to show characteristic symptoms in April. One of them (Floss), beginning with running madness, later developed falling fits, which became so frequent that she was shot in June. The other (Bell), having apparently recovered, was sold to a farmer in Mossdale and, although it had no attacks there, is sometimes blamed for introducing the disease into that neighbourhood. It was, however, returned after a few days and was afterwards sold to a Lunds farmer in whose possession it had one attack in the beginning of September. The shepherd's two other dogs showed no symptoms until the end of July. One of them (Jem) has never had falling fits but only attacks accompanied by running and barking. In

the case of the other (another Bell) the earlier attacks were characterized by standing, not running, and barking; but afterwards falling fits or paralytic seizures occurred. Neither of these two dogs has had an attack since the last week of August.

A census of dogs was taken on November 6th, 1929, the district examined being the head of Wensleydale from Aisgill Moor and Hell Gill farm on the border of Westmorland (or just over it) to Pry House towards Hardraw, Appersett and Hawes; a distance of $6\frac{1}{2}$ miles by road, and including the branch dales of Cotterdale and Mossdale. This district contains 51 dwellings, of which 29 are farms, the other 22 being inhabited mostly by railwaymen. The results were as follows:

	<i>Have had "Hysteria"</i>			<i>Have not had "Hysteria"</i>		<i>Total</i>
Working dogs	16			43		59
Sporting dogs	—			6		6
Pet dogs.. .. .	—			3		3
Puppies	6			9		15
	—			—		—
Total	22			61		83

No adult dogs died of the disease though one was killed accidentally on the road when returning home after an attack of running madness. Two puppies died; but I think it is possible that, in the case of puppies, some different malady may have been mistaken for "hysteria." One of the sporting dogs had fits of some kind three years ago.

The distribution of the disease is erratic and it does not appear to have spread from each farm to its immediate neighbour. One farmer believed that dogs which were fed on wheat-meal suffered from the illness, while dogs fed on "Uveco" escaped. It has been, however, evidently most prevalent in that part of the area which is above, or to the north-west of, Thwaite Bridge, and includes Lunds proper.

			<i>Farms</i>		<i>Adult Working Dogs</i>		
			<i>Affected</i>	<i>Free</i>	<i>Affected</i>	<i>Escaped</i>	<i>Total</i>
Thwaite	Bridge	and					
above	..	..	8	6	13	15	28
Cotterdale	..	..	1	6	2	8	10
Mossdale	..	..	1	2	1	6	7
Below Thwaite	Bridge		0	5	0	14	14
			—	—	—	—	—
Total			10	19	16	43	59

Lunds is, in fact, a pathological island isolated by areas in which canine "hysteria" has not yet appeared. The rate at which the disease spreads seems to be very slow, and the farmers whose dogs have

not yet contracted it are apprehensive that it will ultimately reach their farms.

The sheep-dogs of this district are worked hard and poorly fed, generally on meal, or "Uveco," and skimmed milk: occasionally when they find a dead sheep on the fell, they are gorged for a time and lazy at their work. During hay-time (July) they get less attention than ever. They are also ill-housed, often sleeping on stone floors in draughty buildings, with no other bedding than a thin sprinkling of damp rushes. They suffer from worms and ticks, and in general get far less care and attention than would be expected considering the indispensable service they render and their pecuniary value. These points cannot, however, account for the disease, for there has been no recent change in the dogs' diet or treatment.

The attacks, which occur suddenly without warning of any sort, are of two kinds: (a) running madness, (b) falling fits. The running madness, again, appears in several forms: (1) the dog runs in circles barking, but generally recognises the voice of his master and obeys his orders. Sometimes it does not even run but stands still and barks; (2) the dog gives a bark and rushes straight home, jumping walls and obstacles; (3) the dog leaves its work, makes off in a bee-line across country, and may ultimately be found several miles away; (4) according to rumour the dogs sometimes rush blindly against obstacles such as walls. No actual instance has been reported, but in one case running madness occurred almost daily for two months, and the dog was then shot because it seemed to be growing blind.

The intervals between attacks may be very short, for instance, a few minutes, or in other cases weeks long. A dog that had his first attack on October 2nd has not yet had another. Fan of Quarry had no attacks between September 2nd and October 14th: Mat had none between September 29 and October 30. On the other hand some dogs, for example one belonging to the fell-shepherd, have had attacks almost every time they were released. Sometimes the dogs seem to be in a sensitive condition in which the slightest excitement—a hen running at them to protect her chickens, or a suddenly opened door—will bring on a fit. It is, of course, possible that attacks occur while the dogs are shut up and pass without notice, but this cannot explain the long intervals. The disease is not usually fatal, as will have been noticed from the statistics.

I have witnessed "running madness" only under control in a stable and the above description is from hearsay; the following accounts of attacks are from my own observation:

"Mat," male sheep dog belonging to G. Harvey Ashton, Quarry Farm, Lunds. Sedbergh, Yorks. Age, one year. Weight (on October 11,

after feeding up), 34 lb. Had had seven or eight attacks of running madness in July and August (the first probably on July 19), but none after the first week of September.

Sunday, September 29th, 1929. 10.5 a.m. Hearing a scuffle at the door I went and found my Alsatian standing in an attitude of triumph over Mat, who was in a fit, and my fox-terrier jumping round and barking. (Note : neither of these dogs has yet shown any symptom of the disease.)

Mat was lying on his left side convulsed by alternate spasms of two kinds : (1) a general rapid quivering, the four feet tending to approach one another, the neck bent back and the mouth open ; (2) although still prostrate on his left side, his legs moved as if he were running and his neck was bent down as if he were following a scent on the ground. During convulsions of this second kind he sometimes gave a curious short bark. In both cases a good deal of frothy saliva came from his mouth : it was glutinous and not easily swilled off the pavement with water. I stupidly omitted to observe the pulse, respiration and temperature, nor did I examine the eyes.*

10.10 a.m. The dog was quieter and the convulsions less violent. He raised himself a little, but his hind legs appeared to be weak or paralysed, and he could not stand. Gradually he recovered power to walk clumsily, falling often, failing to avoid obstacles, and apparently unable to co-ordinate the motions of his legs : sometimes he crossed his fore-feet. He generally fell on his left side.

10.20 a.m. Mat had so far recovered that I was able to encourage him to walk to the stable. He followed the wall on his left closely, leaning against it.

10.25 a.m. Mat walked about unsteadily in the stable, knocking things over, and took no notice of a dish of water offered, but upset it. The acute symptoms were over before 11 a.m., and he then drank water.

12.30 p.m. Mat ate a " Spiller's Meat " dog-biscuit (4½ oz.), was able to walk well and anxious to get out of the stable. At 3 p.m. he had water and another dog-biscuit ; and at 6.30 p.m. he ate greedily 11 ounces of " Osoko " soaked in hot water, and appeared very lively.

Monday, September 30th, 1929. Began to feed Mat generously, following—or exceeding—the advice of Colonel H. G. Bowes, F.R.C.V.S. of Leeds University, who had written : " I can only suggest that good nursing is necessary ; the dog being kept warm and its strength main-

* Two independent witnesses have since assured me that in these fits the dog sweats profusely all over. I did not observe this. One of them talking about "slaving fits" said of the sufferers : "they tift (pant) and they tift, and you can't see the heart working for some time."

tained by giving a little meat extract such as Bovril occasionally, and in the early stages before nervous symptoms become very bad, ammoniated tincture of quinine from half to one teaspoonful in water may be given three times a day. After the nervous symptoms appear probably the best treatment is to keep the dog quiet and give ten-grain doses of potassium bromide three times a day." He had : 7 a.m., a biscuit (4½ oz.) ; 9.30 a.m., 7 oz. "Osoko" with a little milk ; 12.30 p.m., another biscuit. His bowels were moved ; and he was sick at about 2 p.m., but ate the vomit. At 2.45 p.m. he had another falling fit, less severe, in which he lay on his right side. Unfortunately I did not see the dog until 3.30 p.m., when he had recovered. At 6.30 p.m. he ate 11 oz. of "Osoko."

Tuesday, October 1st, 1929. Generous diet continued : viz. 7 a.m., biscuit ; 8 a.m., 7 oz. "Osoko" and a little milk ; mid-day, biscuit ; 3 p.m., biscuit ; 7 p.m., 11 oz. "Osoko" with a teaspoonful of Bovril.

Wednesday, October 2nd, 1929. 7 a.m., biscuit ; 8 a.m., 7 oz. "Osoko" with a teaspoonful of Bovril ; mid-day, biscuit. At 4 p.m. I gave him another biscuit, but took it away uneaten at 5 p.m., when Mat looked dull and listless, less lively than usual. This condition was probably due to over-feeding ; but thinking that it might be the after-effect of an unobserved fit, I followed the advice kindly given by Colonel H. G. Bowes and gave him 10 grains of ammonium bromide. At 7 p.m. the dog was still listless, but ate 11 oz. of "Osoko" with a teaspoonful of Bovril.

Thursday, October 3rd, 1929. 7 a.m., offered Mat a biscuit, but he only bit a corner off and I took it away at 9 a.m. At 3.30 p.m. I noticed that he had been sick. At 4.30 p.m. I gave him two "Nema" worm-capsules each containing 1 c.c. of tetrachlorethylene, in a little bacon-dripping.

Friday, October 4th, 1929. 7 a.m., gave him a heaped teaspoonful of Areca Nut mixed with bacon-dripping : this was followed by a motion of the bowels, but no worms were seen. 9 a.m., 11 oz. "Osoko" and a little milk. Mat, who had now been confined for five days in a dark stable, appeared less lively than usual, and I let him run about outside for an hour. 11 a.m. and 4 p.m., tablets of ammoniated quinine (each containing 1 grain of quinine sulphate) ; 8 p.m., 11 oz. "Osoko" with Bovril.

Saturday, October 5th, to Saturday, October 12th, 1929. During these eight days the dog was given the following diet : between 8 and 9 a.m., 11 oz. "Osoko" soaked with hot water and a teaspoonful of Bovril ; between 9 and 10 a.m., a tablet of ammoniated quinine (one grain quinine sulphate) ; between 3 and 4 p.m., quinine tablet ; between 6 and 7 p.m., "Osoko" and Bovril as above ; between 9 and 10 p.m.,

quinine tablet. From Sunday, October 6, onwards he was taken out at mid-day for an hour or more, generally on a lead. On Tuesday, October 8th, he refused his breakfast at 8 a.m., but ate it at 2.15 p.m. on his return from a walk. He ate his supper readily at 6 o'clock the same evening.

On Sunday, October 13th, 1929, he was returned to his master apparently in good health. We hoped, but dared not assume, that he was cured, for Mat had no attacks during the three weeks that preceded his exhibition on September 29th. Our doubts were justified and on Wednesday afternoon, October 30th, after some hard work, he had a short falling fit from which he recovered in less than five minutes. On November 4th he weighed $37\frac{1}{2}$ lb.

Mat's fits were short and he recovered rapidly. In the following case, of which I saw only the end and now describe from memory, the consequences lasted much longer :

"*Fan*," female sheep-dog (mother of Mat) belonging to Arthur Ashton, Quarry Farm, Lunds, Sedbergh, Yorks. Age uncertain, more than five years. Weight on November 7th, 32 lb. Her symptoms began later than Mat's, viz. in August, and she had only three or four attacks of running madness against Mat's seven or eight. A running attack occurred about 6 p.m. on Sunday, September 1st, 1929. She was ill and unable to walk all the next morning, and when I saw her about 1 p.m. that day (Monday, September 2nd) was very restless, wandering about aimlessly from one side of the road to the other, apparently comatose, and refusing to rest even when placed on a sack in the sun. She behaved as if she was blind, taking no notice of food placed in her way but walking over it, stumbling at obstacles and falling over banked edges. She was very weak and her hind legs appeared to be partly paralysed. Sometimes she collapsed altogether, slobbered at the mouth, and seemed to be about to die. She recovered gradually, however, without treatment, and in a few days was able to resume her usual work, but had a relapse on Monday, October 14th : two mild running attacks when bringing stock back from Hawes.

It seems probable that this dog, notwithstanding her relapse, will be able by her own strength to recover from the disease.

In the following case an attempt was made to ensure and hasten recovery by artificial means :

"*Fan*" (Place), female sheep-dog (sister from the same litter as *Fan of Quarry*) belonging to Thomas Atkinson, Place Farm, Lunds, Sedbergh, Yorks. Age uncertain, more than five years. Weight (on October 26th, after feeding up), 44 lb. A dog of quiet disposition, she is well tended by her master and was in good condition and fat, although she receives only the customary two daily feeds each consisting of about

ten ounces of scalded meal and a pint of skimmed milk. She first developed canine "Hysteria" in the middle of August and had at intervals four attacks of running madness followed by two falling fits. Then on *Monday, October 14th, 1929*, she had three serious falling fits all on the one day. She was put in a dark stable and I saw her on *Tuesday 15th* and *Wednesday, 16th October*, looking well and arranged that her master should diet her at home under my directions, not working her but giving her a little exercise.

Thursday, October 17th and *Friday, October 18th, 1929*: 8 a.m., 10 ounces meal, a pint of skimmed milk and a teaspoonful of Bovril; 9 a.m., a tablet of ammoniated quinine (1 grain of quinine sulphate); 3 p.m., quinine tablet; 8 p.m., meal, milk and Bovril; 9 p.m., quinine tablet.

Saturday, October 19th. The dog was given neither food nor water after the quinine on the previous evening, in preparation for treatment to remove worms. When I visited her for this purpose she came out of her bed when called, but walked unsteadily as if she were just recovering from a fit. There was, however, no froth at the mouth.

11.30 a.m., three "Nema" capsules, each containing 1 c.c. tetrachlorethylene, in a little butter. 1.30 p.m., a heaped teaspoonful of Areca Nut powder mixed with bacon-dripping. 2 p.m., a pint of milk. 3 p.m., offered the dog a biscuit. She looked dull and refused it, but ate it later. She had had a normal motion of the bowels. 8 p.m., 10 ounces "Osoko," a pint of fresh milk, and a teaspoonful of Bovril. She ate her meal slowly and did not clean the dish. Diarrhoea at night: no worms seen. The dog had no quinine this day and was not taken out for exercise.

Sunday, October 20th, to Saturday, October 26th. During these seven days Fan had the same diet as on October 17th and 18th. She had a little exercise every day and on *Friday, October 25th*, was of necessity taken out for a short time to gather some sheep. She worked well and appeared to be improving in health.

Sunday, October 27th, 1929. She had her usual breakfast and quinine tablet in the morning. At 1.30 p.m. while out for exercise with her master, she had two attacks of running madness. The first was very short, the second longer. Her master held her to prevent her from running away, and on recovery she seemed as well as ever. He says that during these attacks her eyes turned green. Hearing about this relapse I visited the dog at 5 p.m., taking my Alsatian with me, and found the patient very friendly and playful. Suddenly her gait became abnormal and her master, seeing that an attack was coming, seized her by the collar and continued patting her side. Fan remained standing, gazing in front of her with a fixed stare that seemed to imply

unconsciousness, trembling, and barking sharply in a curious high-pitched voice. The attack lasted less than five minutes and was not followed by any apparent weakness. There was no slavering nor sweating, and she made no attempt to snap or bite. The attack may have been caused by excitement due to the presence of my Alsatian of whom Fan is afraid.

In consequence of this relapse I changed the dog's diet, substituting "Osoko" for meal, and ammonium bromide for quinine. The change began the same evening.

Monday, October 28th, and Tuesday, October 29th, 1929. 8 a.m., 10 ounces "Osoko," a pint of skimmed milk and a teaspoonful of Bovril. 9 a.m., 10 grains ammonium bromide. 3 p.m., 10 grains ammonium bromide. 8 p.m., "Osoko," milk and Bovril. 9 p.m., 10 grains ammonium bromide. She had a little exercise each day, and on the second day seemed less brisk than usual.

Wednesday, October 30th, 1929, and afterwards. For about a week the diet of October 17th and 18th was resumed, some "Osoko" being given at the beginning in place of meal, and Fan was gradually inured to her usual work.

The discouraging fact must be faced that Fan of Place, with all her dieting and drugs, made no better nor quicker a recovery than her sister, Fan of Quarry, who had no treatment of any sort.

The means by which the illness is spread are unknown here. The first dog in which it was observed in this neighbourhood belonged to the fell-shepherd, Philip Harrison, who seldom took it with him because it was a bad follower. In Mallerstang, where he lives, there had been no case before this, and there has been no case since, except among his dogs. The disease was prevalent at Middleham (at the lower end of Wensleydale) a year since; but at the end of September, a pet dog belonging to Miss Topham had a mild fit. This dog never goes outside the grounds of Middleham House and never sees a strange dog. My Alsatian and fox-terrier, which frequently meet other dogs, were present at Mat's performance on September 29th, and were not kept away from him during his convalescence, but still show no symptoms. The third dog at Quarry Farm, where Mat and Fan live, has had no attacks; and similar cases are common, reminding one of the two women grinding at the mill. This capricious incidence is difficult to explain unless some parasitic tick, insect or worm from which an individual dog, even when living in close association with others, may be free, is the carrier of a new infection.

The epidemic is so serious for the small farmers of this district, who are much dependent on their dogs, that it was thought advisable to circulate the following suggestions:

So-called "Canine Hysteria."

Inquiries made from Lieut.-Colonel H. G. Bowes, F.R.C.V.S., of Leeds University, from authorities in London, and from other persons, show that although this illness, called in America "Fright Disease," has been known for several years, nobody can tell us what is its cause, how it is spread, nor how to cure it. In Lunds we have therefore followed advice given by Col. Bowes, and when a dog shows symptoms of the malady have tried to get it into a condition of good general health in the hope that its own strength will enable it to conquer the disease. We do not profess to have found a cure for canine "Hysteria," and indeed a dog treated in the way described below relapsed on the eleventh day and had three attacks of running madness. The attacks were, however, mild compared with the falling fits from which it suffered before the treatment was begun, and the dog recovered rapidly.

i. For the sake of quiet and to avoid excitement we have kept the affected dogs shut up in dark stables giving them an abundance of warm bedding and taking them out each day (except on the day when worm-medicines are given) for an hour's gentle exercise.

ii. We have made sure that they are free from worms.

iii. Because dogs are carnivorous animals and need flesh-meat we have replaced the diet which is usual in this neighbourhood by dog-food or dog-biscuits containing meat, and a little Bovril.

iv. We have given them one grain of quinine three times a day.

The course of treatment lasted a fortnight, the diet for the first two days and for the fourth to the fourteenth days (that is, all except the third day) has been :

8 a.m., 10 to 14 ounces of Spiller's "Osoko" soaked in milk and hot water to which a teaspoonful of Bovril has been added.

9 a.m., a tablet of ammoniated quinine containing one grain of quinine sulphate.

3 p.m., another quinine tablet.

8 p.m., "Osoko," milk and Bovril as above.

9 p.m., a third quinine tablet.

After the last quinine tablet at 9 p.m. on the second day the dog was shut up and given no food of any kind, not even water, until after it had taken the worm-medicines on the following day (the third) when the diet was as follows :

8 a.m., three "Nema" worm-capsules No. 187 (veterinary), each containing one cubic centimetre of tetrachlorethylene.

10 a.m., a heaped-up teaspoonful of Areca Nut powder mixed with butter or bacon-dripping.

11 a.m., a pint of fresh milk.

8 p.m., "Osoko," milk and Bovril as usual.

9 p.m., a quinine tablet.

On the fourth day the generous diet of the first two days was resumed. After the fortnight was over the dog went back to work and medicines were stopped. But it was recommended that a little meat and bones, or dog-biscuits containing flesh, should be added to its usual food.

It is hoped that this description of canine "hysteria" will prove useful in view of the fact that attacks, occurring always unexpectedly, are seldom seen by any but the dogs' masters. For detailing at such great length a course of treatment that has not proved efficacious, my only excuse is that some authority on dogs may thereby be spurred to suggest a better. It would be a very great boon if somebody could tell us how to avoid the disease, and, if the symptoms appear, how to treat it.

ABSTRACT FROM THE REPORT OF THE DEPARTMENTAL COMMITTEE ON THE RECONSTRUCTION OF THE ROYAL VETERINARY COLLEGE.*

(Concluded.)

Government of the College.

After hearing the views of several members of the Governing Body, we make the following recommendations for the future government of the College :—

(a) A Court of Governors should be constituted representative of various agricultural and veterinary institutions or societies having interests in the College, as well as of public men and subscribers aiding its work, the Court to have a President and Vice-Presidents.

(b) The executive governing body having the management of the funds of the College and the direction of its work should be a Council constituted as shown below.

(c) The Court of Governors should take an important part in appointing the Council. The Court should meet at least once a

* The Complete Report can be obtained from H.M. STATIONERY OFFICE at the following addresses: Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any Bookseller. Price, 1s. 3d. net.

year to receive and discuss the annual report of the Council and to make such representations upon it as they think fit.

The proposed constitutional machinery may be set out as follows :—

PRESIDENT :

VICE-PRESIDENTS :

COURT OF GOVERNORS :

To be composed of (a) the members of the Council (ex officio) ;
(b) twenty representative members appointed by such bodies as the Royal College of Veterinary Surgeons, the Royal Agricultural Society of England, etc. ; (c) ten members elected from their own number of subscribers.

THE COUNCIL :

To consist of twelve members nominated in the following manner, who would appoint their own Chairman and Treasurer :

one by the Privy Council and three by the Government Departments principally concerned, viz. Ministry of Agriculture and Fisheries, Ministry of Health, and Colonial Office ;

four by the Court of Governors ;

four by other bodies, viz. University of London 1, Royal Society 1, Royal College of Veterinary Surgeons, 2.

The Council should meet regularly, say, once a month.

The educational and research work of the College should be under the general supervision of the Director or Principal. He should be present at all the meetings of the Council and act (with necessary clerical assistance) as their Secretary.

From the educational staff should be constituted an Academic Board consisting of the professors and readers, with rotating adequate representation of the junior teachers. The Director or Principal would be the Chairman of the Academic Board, and their normal channel of communication with the Council.

The Council would, as at present, be finally responsible for the affairs of the Research Institute, though its direct management would continue to be entrusted to a Committee which would include a certain number of outside scientific members.

If the recommendations are carried out, they will involve a capital outlay of approximately £325,000 ; an additional maintenance charge on the College which may be roughly estimated at £21,000 per annum, together with a sum of some £4,500 per annum and upwards to cover the cost of research in the professional departments ; and a substantial addition to the annual grant now made by the Ministry in respect of the work of the Research Institute. We realise that these are relatively

large figures, but we have before us three main considerations. First, the Royal Veterinary College, which is the oldest and most widely-known institution for veterinary education and research in the Empire, has been carrying out its work under conditions which are discreditable to a civilised community, and is now in imminent danger of closing down for lack of funds. We cannot think it right that there should be such an end to the labours of nearly a century and a half—labours, moreover, of which the continuance is imperatively demanded by the national interest. Secondly, it is useless to contemplate half measures ; if the reconstruction of the College is to be undertaken at all, it must be undertaken thoroughly. Thirdly, in its main outlines such a reconstruction must be designed to meet the requirements not of a few years but of the next half century, it is neither right nor possible to expect that the effort now required can be soon repeated.

Our proposals will, we think, seem moderate to anyone who reflects on the great importance of the dairying and live-stock industries, and on the immense national losses through diseases of stock. The veterinary profession cannot be expected to bear the burden of cost ; its numbers are small and its resources extremely limited. We can only conclude by saying that the interests of the community are deeply involved, and the community must decide whether it can afford to be content with anything less than an adequate and progressive system of veterinary education and research.

Summary of Conclusions.

1. The condition of the Royal Veterinary College is a national disgrace. The building is for the most part in a state of dilapidation and much of it has been condemned by the local authority as a dangerous structure. At the end of the current year the Governing Body will have exhausted all its funds, and the prospective income is insufficient to cover essential expenditure.

2. The ideals of scientific attainment desirable for a veterinary surgeon, and the status of the veterinary profession, have suffered by the lack of proper educational facilities and by the miserable conditions by which the College students have been surrounded.

3. The College needs rebuilding and re-equipping so as to meet not only the requirements for the education of the veterinary practitioner, but the need for officers to satisfy the growing demands of the State and public authorities. Provision should also be made for the proper training of veterinary surgeons for the colonial veterinary services.

4. In view of the increasing demand for adequately trained veterinarians both in this country and in the colonies, and of the

educational facilities available at other centres, the rebuilding scheme for the Royal Veterinary College should allow for a total accommodation of 250 students with an annual entry of 75.

5. The question of site must be governed by two considerations ; first, the need for securing the steady flow of sick animals essential for the adequate instruction of students ; second, the importance of providing the veterinary students with facilities for intermingling with those in other branches of learning. For these reasons a rural site is undesirable. The College should be situated in the vicinity of a centre of population, and should be closely associated with a University.

6. London, with its vast population, ensuring the maintenance of adequate clinical material, and by reason of its accessibility, possesses many advantages as a centre of veterinary education. It is reasonably certain that the University of London would admit the College as a School of the University on conditions which the Governing Body (assuming their finances made it practicable) would be willing and glad to accept.

7. It would therefore be in the best interests of the College to remain in London and to secure recognition as a School of the University.

8. The future requirements of the new College, as briefly indicated in paragraphs 3 and 4 above, have been incorporated in outline plans. A building so planned could be erected on the present site at Camden Town, assuming that the existing buildings with the exception of the Research Institute, were demolished.

9. As the College has been at Camden Town since its foundation in 1791, where it has built up a considerable professional connection in that district, and no other area of land of sufficient size is available in the neighbourhood, it is desirable that the new building should be erected on the existing site, even though its size is only just adequate for the purpose.

10. The freehold of the existing site, if it can be obtained at a reasonable price, should be acquired, together with that of the adjoining site on the north side (now occupied by cottages) in order to permit of subsequent extension.

11. The estimated approximate cost of the suggested new building, including equipment, is £280,000. If the freeholds mentioned in the preceding paragraph could be secured for £20,000, the all-in capital cost of the rebuilding scheme may be put at approximately £300,000.

12. The cost of staffing and maintaining the new College would involve an additional charge on the College funds which may be roughly estimated at £21,000 per annum. It would be unwise to embark on the erection of new buildings unless such additional income were in

sight. Provision will also be wanted for the expenses of research carried on in the nine professional departments of the College, which may cost from £500 upwards per annum for each department, according to the extent of its research activities.

13. The Research Institute should remain where it is, but the existing maintenance grant of £5,000 per annum from the Ministry should be substantially increased. The Institute should also be provided with a field station in the vicinity of London for the purpose of experimental work with the larger animals, and a sum of £25,000 should be made available for its purchase and equipment.

14. More effective co-operation should be established between the College and the Research Institute.

15. The government of the College should be reconstituted under a revised Charter. Executive responsibility should be in the hands of a small body of men, selected for their personal qualities and acquaintance with the needs of veterinary education.

Appendix A.

EXTRACT FROM THE REPORT OF THE COLONIAL VETERINARY SERVICES ORGANISATION COMMITTEE (CMD. 3261).

(The Committee was appointed in July, 1927, under the chairmanship of The Lord Lovat, K.T., K.C.M.G., K.C.V.O., C.B., D.S.O., and reported in November, 1928.)

* * *

18. But the trouble goes deeper than this. It is not merely a question of curriculum, but the conditions under which the training is given. In our opinion these conditions are profoundly unsatisfactory. The main cause is lack of funds. The first veterinary school was founded in 1791 and from the beginning has been handicapped in this respect. The other schools which have been formed later have all suffered from the same defect. As a consequence it has not been possible to offer sufficient inducements to attract enough qualified teachers. Most of the existing staffs appear to instruct in too many subjects and the accommodation and equipment at their disposal are often lamentably inadequate.

19. In order to check the disturbing evidence which we received on such points as these, we visited the Royal Veterinary College at Camden Town, by invitation of the Principal. We do not hesitate to say that we were dismayed by what we saw. While we were much impressed by the efforts which the Principal and his staff are now making under adverse conditions, we could not but receive a general impression of starvation and neglect. We noticed that the walls in many of the buildings were dangerously cracked and propped up by struts for the sake of safety. The students in the laboratories were so cramped that efficient work on their part seemed impossible. We were told that hot water was not laid on throughout the building and we noted that telephones and electric light were only then in process of being installed. What a contrast to the order and cleanliness and the wealth of modern resources and equipment which are so obvious in any of the medical schools attached to the

great hospitals! It is nothing short of a national disgrace that such a condition of affairs should be allowed to continue. The blame, we think, does not lie with the teaching staff, labouring as they do under the great disadvantage of inadequate salaries in a school which is both inadequately staffed and equipped. On the contrary, they have made great personal sacrifices, and have themselves provided much of the existing equipment.

20. As in the Colonial Veterinary Departments, the root of the trouble is lack of funds and a certain apathy and lack of vision. Veterinary schools in this country receive but little help from the State and have to rely mainly on students' fees. When we compare the large veterinary institutions in other countries, supported principally by State funds, with those that exist in Great Britain, the contrast is somewhat depressing. We have already referred to the large annual appropriation from Government funds in the Union of South Africa: in Germany the Veterinary College of Berlin receives an annual grant from the State of the value of £28,000. Starved as they are of financial support and cramped and confined in their activities, it is clearly impossible for the veterinary schools to give a training of the scope and quality needed. The profession must needs suffer in efficiency and prestige, and consequently in the attraction it offers as a career to the youth of the country.

21. We have found it necessary to speak strongly on this matter, because the general policy in force seems to be one of drift, and new schemes are framed merely according to available funds and not on any comprehensive plan based on a true appreciation of what is needed. We are convinced that the problem of animal health is so important that the existing conditions both in the training institutions at home and in the Veterinary Departments of the Colonies should no longer be tolerated. In both a new policy is needed, framed on bold and comprehensive lines, supported by adequate funds, and carried through with energy and determination.

Appendix B.

STAFFING AND ACCOMMODATION PROPOSALS.

The College will consist of nine departments as under:—

(1) surgery and obstetrics; (2) medicine; (3) animal husbandry, zootechnics, hygiene and State medicine and the production of meat and milk; (4) pathology, with bacteriology and animal parasitology; (5) pharmacology and therapeutics; (6) physiology with animal nutrition and bio-chemistry; (7) anatomy, surgical and applied anatomy, histology and embryology; (8) biology, protozoology, entomology and genetics; (9) chemistry with toxicology and elementary physics.

For these departments accommodation on the scale set out below is considered desirable:—

Chemistry, Biology, Physiology, Pathology, Pharmacology.

These five departments to have one classroom each. For chemistry and biology each classroom should be capable of accommodating 75 students. For the remaining three subjects provision for 50 students in each classroom would suffice.—In addition, each department to have the spatial equivalent of six extra rooms (approximate dimensions 20

feet by 15 feet) to serve as a Professor's Room, an Assistant's Room and Laboratory, Service Room, etc., according to their individual needs.

Anatomy (including histology).

Six rooms to serve as a Professor's Room (corresponding to a classroom for 50 students), an Assistant's Room, a Bone Room for approximately 40 students, a Dissecting Room for 75 students, a Demonstration Room and a fairly large room for histological students.

Medicine and Surgery.

Five rooms for each subject. A demonstration theatre for sole use of surgery department should also be provided.

Hygiene.

Six rooms including a spare room (each comparatively small).

Special considerations supplementary to the above outlines:—

Chemistry Department.—One room should be a Private Laboratory for poison and water analysis.

Balance room for students' use—say six places—may be artificially lighted.

Biology Department.—Students' laboratory should be a long narrow room north lighted with two parallel benches and wall cases for specimens.

Physiology Department.—Benches 16 feet long by 4 feet 6 inches wide, each for eight students.

Pathology Department.—Requires media kitchen, special laboratory for serums and should be placed conveniently to Post Mortem Room.

Pharmacology Department.—Wall cases for specimens in Class room.

Anatomy Department.—Slaughterhouse and preparation room needed in connection with Dissecting Room and Demonstration Theatre, with means for moving carcasses. Some storage space for live animals.

Medicine Department.—Waiting Room for Patients; clinical diagnosis room for medical and surgical consultation; pharmacy and drug store adjoining consulting room. This department should be contiguous to hospital.

Surgery department including hospital (see also under "Free Clinic").

Operating rooms for small and large animals with preparation, sterilising, and instrument rooms.

Provision for housing about 20 large animals (divisible into medical and surgical cases).

Fodder store, harness room, grooms' messroom.

Food preparation room, horse foot-bath, forge, destructor, covered manure pit, motor ambulance garage.

Reception stable near entrance.

Canine wards and kennels with bathing and feeding provision.

Cat and bird wards on upper floor.

Isolation kennels for dogs and cats with attendants' rooms.

Dressing and bandage rooms, ray-treatment rooms, photographic rooms.

Covered ride for horse exercising; runs and exercise yard for dogs and cats.

Hygiene Department.—Room for exhibition of lecture models of construction, ventilation, drainage, foodstuffs, etc.

Laboratory for testing water, and other minor tests.

Lecture Rooms.—A large Lecture Theatre to seat 250 students and two smaller Lecture Rooms each for 100 students, available to any department, should be provided. The large theatre should be so placed as to be available also for public functions.

Museum.—A museum adequate to the needs of all departments, excepting for lecture specimens, which in some cases would be housed in class rooms.

Library.—A students' library, which it is suggested should also be fitted so that it may serve as an Examination Hall and for an occasional social gathering.

Social Rooms.—Common rooms for male and female students and for teaching staff, and a refectory with kitchen and other service provision.

Cloak rooms, lavatories, etc., for students, staff, and special departments; storage for cycles.

Administration.—Public Entrance Hall with porters' and telephone boxes. Public Waiting Room, Clerk's Office, Waiting Room for use with Principal and Secretary's Offices. Principal's Room, Secretary's Office with Typists' Room. Board Room.

Resident Staff Accommodation.

A flat for the Principal.

Bed-sitting rooms for three single house surgeons with common room, bathroom, etc., and catering provision in connection with a housekeeper.

A small flat for a caretaker housekeeper (married couple) responsible also for the College catering.

A small flat for the head groom (married couple) near entrance to hospital, and so placed that care of House Surgeons' quarters may combine.

Rooms for second groom near back entrance to hospital.

The Free Clinic.

Reception hall for small animals.

Waiting room.

Some lavatory accommodation, male and female, 1 W.C. each, 1 urinal.

Consulting room—two tables.

Dressing room, with glass cupboard, instrument cases.

Operating theatre for small animals (free clinic only).

Sterilizing and instrument rooms in connection.

X-ray room and X-ray apparatus, ultra violet, for use of whole College, see under Surgical Department.

Professor's room.

Assistant's room, fitted as laboratory with centrifuge, microscopic work bench, sink, etc.

Small pharmacy for issue of medicine.

Animal Accommodation.

Two boxes, divisible into four stalls.
 Forage space.
 General store.
 Ward for 12 kennels with run.
 Ward for small animals.
 Food preparation room.
 Bath.
 Attendant's room.
 Isolation ward, say for 10 kennels.
 Special ward for one or two kennels.

Post-mortem Department.

Post-mortem room.
 Cold storage plant.
 Sterilizing plant.

THE VALUE OF VETERINARY RESEARCH.*

By L. E. W. BEVAN, M.R.C.V.S.,

Director of Veterinary Research, Southern Rhodesia.

"Ex Africa semper aliquid novi." --Pliny.

IT is a well-known fact that the ultimate prosperity of any country chiefly depends upon its pastoral industries, and in order that this prosperity may be permanent it is necessary that it should be built upon a sound foundation. To this end it is necessary to obtain an exact knowledge of the diseases to which the various species of live stock may be subjected, for it is only upon such knowledge that measures of prevention and control can be established.

Veterinary Research, therefore, may be regarded as a form of insurance against disease, without which the breeding of live stock for commercial purposes is constantly threatened with disaster. It is necessary only to mention the ravages of Rinderpest in South Africa in 1896, the enormous losses which have been occasioned by East Coast fever in this country, or by Foot-and-Mouth disease in Great Britain, to emphasise this point. Indeed, it might have been expected that this principle would be generally recognised and it is more than surprising to find that this is not the case.

Neglected by the State.

Even in Great Britain, which produces the finest live stock in the world and where the pastoral industries are of primary importance,

* Reprinted by kind permission of the Editor of "The Countryside," Salisbury, Rhodesia.

one finds Veterinary Science almost entirely neglected by the State. In recent issues of veterinary periodicals the following pathetic advertisement frequently appears :—

S.O.S.

TO OLD STUDENTS OF THE ROYAL
VETERINARY COLLEGE.

YOUR ALMA MATER NEEDS YOUR HELP!

£250,000 REQUIRED FOR REBUILDING AND ENDOWMENT.

"The Pioneer College of the British Empire asks your aid to make it worthy of its proper position amongst the Veterinary Colleges of the world. Persuade your clients to subscribe and leave legacies. Address : The Earl of Northbrook, Royal Veterinary College, London, N.W.1." It is true that the Government has promised to subscribe pound for pound up to the sum of £35,000, but it is, to say the least of it, unworthy of the greatest stock-raising country of the world that the humble and often impecunious members of a small profession should be called upon to shoulder so heavy a responsibility. It is, as it were, "asking the horse to grow its own corn." And if the general science of veterinary surgery and medicine is in such a parlous state, can it be expected that any special branch of it, such as research, can fare better? Indeed, until recently, it scarcely existed except through the efforts and enthusiasm of a few self-sacrificing individuals. At the present time a few laboratories and research stations have been established, some aided by state, others by universities and colleges, but as compared with those in other countries they are insignificant and inadequate.

A Policy of Drift.

The same lamentable state of affairs obtains throughout the British Colonies, and a Committee of very responsible and pre-eminent statesmen and scientists has recently issued a report on "Veterinary Research and Administration in the Colonies" from which the following paragraphs are selected :

"The unanimous report of this Committee has now been issued and in a general review of the situation, present and future, it emphasises the growing importance of veterinary activities in the Colonial Empire, not only from the point of view of the Veterinary, Medical and Agricultural Sciences, but also as an integral part of the social and economic

development of the Colonies. The important role which the veterinarian is called upon to play, shows the necessity of attracting to the profession men of high scientific training and attainment."

"It holds that veterinary problems in the tropics have not received the same attention as in temperate climates; and Britain, which in the past has done much for tropical medicine, tropical agriculture and tropical forestry, has done little for tropical veterinary science. The non-self-governing Colonies and Protectorates have stock-raising as one of their major industries, and losses from disease and lack of knowledge of health and nutrition, as well as absence of stock for transport and tillage, show the necessity of adequate veterinary attention."

"The Committee believes that the importance of this has not received the official attention which it deserves and veterinary departments are in general neglected and under-staffed. At present there are only 127 qualified officers in the Service, or one to every 16,000 square miles, 400,000 inhabitants, or 280,000 head of stock. The entrance to the Service is low and the emoluments do not attract sufficient men of the right type and there is no provision for even a preliminary course in Tropical Veterinary Science."

"The Committee has found it necessary to speak strongly on this matter, because the general policy in force seems to be one of drift, and new schemes are framed merely according to available funds and not on any comprehensive plan based on a true appreciation of what is needed. It is convinced that the problem of animal health is so important that the existing conditions both in the training institutions at home and in the Veterinary Departments of the Colonies should no longer be tolerated. In both a new policy is needed, framed on bold and comprehensive lines, supported by adequate funds, and carried through with energy and determination."

At Onderstepoort.

In other parts of the British Dominions the necessity for Veterinary Research has been recognised, and especially in the Union of South Africa, where the Laboratory at Onderstepoort, created by Sir Arnold Theiler, compares favourably with any other similar institution in the world, and where the excellence of the work performed has earned world-wide recognition. This establishment which must have cost at least a million pounds to build and equip, and upon which the sum of about £90,000 is spent annually on research, vaccine production, services and veterinary education, is a tribute to the foresight and sagacity of such men as Botha and Smuts who realised the importance of scientific research as a means of overcoming the numerous diseases

which crippled the animal industries of the country and threatened their progress in the future. In a recent number of the journal of the South African Veterinary Medical Association, Dr. P. J. du Toit, the present Director of Veterinary Services, contributes a very illuminating article on "The Veterinary Services of the Union of South Africa." He describes these services as comprising the following activities :—

- (a) The control of all important epizootic diseases, especially those enumerated in the Stock Diseases Act.
- (b) Research work into animal diseases and general problems affecting the health of animals.
- (c) Production of certain vaccines, sera, remedies, and other articles used in treating animal diseases.
- (d) Advice to farmers and general propaganda work on veterinary matters.

A further function, which partly falls under the University of South Africa, is—

- (e) The training of veterinarians—for which purpose certain officers of the Division constitute the Faculty of Veterinary Science.

The Need for Research.

He describes how the necessity for research and for State veterinary control was brought home by the "rinderpest epizootic, which spread over South Africa during the closing years of last century and killed off in the neighbourhood of two million head of cattle. Investigators from various parts of the world were invited to study the disease, and the methods then evolved here in South Africa still form the basis of present-day control of this disease." He adds "it is safe to say that the knowledge gained during those years has enabled us to keep the disease out of the country during all these intervening years, and the money spent on that research has undoubtedly been repaid a thousand-fold and more. . . ." It is unnecessary to point out that Rhodesia was also devastated by this disease and must attribute its freedom from it to-day to veterinary research. The disease still exists to the north in parts of Central Africa, but thanks to science no longer constitutes the menace which it did before the very effective serum method of inoculation was discovered.

East Coast Fever.

Du Toit also deals with East Coast fever and states: "If we have not been successful in the course of the last twenty-five years in completely stamping out this disease, the fault does not lie in our lack of knowledge, but in the almost insuperable practical difficulties attending the measures of eradication. Nevertheless, sight should not be lost of the fact that, in the case of this disease, too, the direct result of re-

search work has been a saving of enormous sums to the country. What the position of the beef and dairy industries would have been to-day if the disease had never been investigated, it is difficult to estimate. Only ignorance of the facts can explain the statements which are still sometimes made, that it would be better to remove all restrictions and let the disease run its course." He then proceeds to discuss some of the more important diseases against which vaccines and other laboratory products are issued. For example, blue-tongue, a disease which "has probably been present in South Africa as long as sheep farming has been practised." He shows that in 1907 a vaccine was issued which conferred protection against this disease, and that since that date more than twenty-three million doses have been issued. He arrives at the conclusion that probably three million sheep have been saved during those years as a result of the preventive inoculation and that at least three hundred thousand sheep are saved annually from certain death. He proceeds to point out that last season more than twenty-three million doses of wire-worm remedy were issued and adds "when we take into consideration the serious losses from this disease which sheep farmers suffered prior to the discovery of this remedy, and the losses which occur in other countries to this day, it is safe to say that the benefit to South Africa may be calculated in hundreds of thousands, if not millions of pounds annually. In many parts of the country profitable sheep farming would be impossible without this remedy."

With regard to Anthrax he says: "The vast majority of the two to two and a half million animals vaccinated annually are exposed to infection and if we assume that only a quarter of them would actually have contracted the disease had they not been immunised, we arrive at a saving of half a million animals annually."

Referring to Horse-sickness, he writes: "The parlous state of the horse industry in South Africa to-day must partly be ascribed to the prevalence of horse-sickness. Much time and energy have been devoted to the study of this disease, the main object being to find a satisfactory method of immunisation. The immunisation of mules has been eminently satisfactory, and since 1903 many thousands of mules have been immunised with excellent results. It has been stated that, if Onderstepoort had achieved nothing else than the immunisation of mules against horse-sickness, it would have justified its existence." "In the case of horses the method has not been so successful, it being much more difficult to immunise a horse than a mule."

The above extracts and figures give some idea of the enormous benefits which have been derived from veterinary research in South Africa, benefits in which, it should be remembered, Rhodesia has been permitted to participate.

Clinical Articles

Stricture of the Urethra in the Horse.

By R. HUDSON, F.R.C.V.S.,

Retford.

THE subject was a shire gelding, six years old.

History :—He had been castrated as a yearling and the operation had passed off normally, as far as the groom was able to tell.

He was broken at four years old and soon after it was noticed that he had a discharge from one side of the scrotum.

When put to work he was noticed to have urinary trouble, in that he frequently urinated in small quantity, and that it dribbled away when he was standing.

During the two years he worked light, and it was only by resting and good feeding that he was kept strong enough for work. He was a keen, good worker when fit to do anything.

For some months difficulty in passing urine has been increasing, but he has always been able to pass it in a small stream, sometimes straining hard without making much increase in the volume passing after straining. The urine continued to dribble away, his penis hanging for about a foot, and retraction taking place when moved.

The urine passed has varied, sometimes being clear, but often with stringy mucus-like clots.

For some time now he has bitten and licked at his flank about the ext. angle of the ilium but at no time has he shown any " colic " pain.

When seen by me in March, 1929, he was refusing food, breathing increased, pulse 85, temp. 103° F., licking repeated at his flanks, stretching, and passing urine in a thin stream.

Pressure at the end of the urethra yielded a few drops of pus-like material ; which, on microscopical examination showed an abundance of streptococci.

An examination per rectum revealed the bladder to be about half distended, and on each side of the neck two large saccular dilatations. The naturally enlarged ends of the vasa deferentia could be plainly felt and the dilated sacs lay across and to the sides of them.

The scrotal wound on the right side (castration) had not healed and was exuding a small quantity of sticky grey pus. Thickening of the testicular cord could be traced to the inguinal ring.

The horse was observed daily for some days and given 8 oz. sod. chlor., 1 oz. formalin in 2½ galls. of water by tube.

He improved in appetite and general symptoms and on the second day the saccular dilatations could scarcely be felt.

The case was diagnosed as abscess formation in the vesiculæ seminalæ, and infection of the urethra due to the process passing along the vas deferens.

Owing to the septic condition of the urethra a catheter was not passed for fear of spreading infection to the bladder which did not appear, on rectal examination, to be abnormal, though it never felt empty.

Although improvement took place during the few days he was under treatment it was evident that the dilated sacs were still there, and I thought they were causing pressure on the neck of the bladder and difficulty in passing urine; so I decided to puncture them per rectum.

This was done with a long seton needle on the right side only, because the horse strained so badly and partly everted the rectum.

Some fluid escaped which smelt of urine, and no doubt a quantity did escape into the rectum and caused irritation and straining.

After the operation the sac could not be felt.

During the next 48 hours the horse refused all food, his pulse rose, and he looked depressed and sleepy. His mucous membranes became highly coloured, but later cleared. He had difficulty in passing fæces, and the urine dribbled from the urethra as before.

He became semi-conscious, probably from uræmia, and I thought urine might be entering the peritoneum as well as the rectum so he was destroyed.

Post-mortem Examination.

On opening the urethra the mucous membrane was found to be covered with a diphtheritic deposit. At intervals along the lower portion for about one foot were five strictures. The upper one almost occluded the track,

The pressure of urine having forced a diverticulum about three inches long along the side of the urethra.

The pelvic portion of the urethra was widely dilated admitting my hand freely into the bladder, and four fingers into both ejaculatory ducts which, when opened, allowed my hand to pass into the vesiculæ seminalæ.

The right vesicle would have held a quart of fluid and the left about one pint. They contained a quantity of urine and deposit similar to that on the urethra. The bladder at the base was about one inch thick.

The mucous membrane inflamed and covered with a blackish-grey deposit.

Search was made for the rectal wound and it was traced into the right vesicle, but there was no evidence of further penetration into the abdominal cavity.

The area around the penetration was not so bad, and it was evident that urine had been escaping along the track into the rectum and into the tissues along side it, but not for far.

The kidneys were macroscopically healthy, and the abdominal organs also presented a healthy appearance.

The vasa deferentia contained a grey pus which, on microscopic examination showed pus organisms.

Choking in Cattle.

By R. HUDSON, F.R.C.V.S.,

Retford.

THE feeding to cattle of large quantities of unsold potatoes has been productive of many cases of choking here recently, and their dry rough and soft condition has made the removal of the obstruction more difficult than usual.

When the obstruction has been below the middle of the neck it has usually been forced with the probang into the rumen with safety, but when it is a few inches from the pharynx the removal has often been attended with serious injury.

There is usually some farmer in the village who fancies himself with the "choke rope," one of the bullet ended type, which usually does damage by slipping off the obstruction and lacerating the wall of the œsophagus. Three such cases happened in one week recently, and either died or necessitated slaughter. When the obstruction is within reach of the fingers with the hand in the pharynx, and effort is usually made to withdraw it into the mouth, and in my experience it has generally been "some job" and to simplify it I have adopted the following procedure with satisfactory results.

One cannot pass the hand down the mouth of cattle many times without it being scratched by the sharp molars, so it is best to spend a minute or two rasping off their points. Any old tooth rasp, heated to red heat and bent up at the end does this very well. It should be re-heated and slaked in cold water to regain its temper. The animal is cast on its right side and the mouth safely gagged. Having located the obstruction from the outside of the neck, the jugular vein is filled

up by pressure from below and an incision about 3 inches long made below its lower border or below the submaxillary vein on a level a little in front of the obstruction. Cutting freely through the underlying muscle one enters an area of loose connective tissue and seeking the rear of the obstruction with the right index finger it is pushed into the pharynx to be received by the fingers of the left hand and withdrawn out of the mouth.

One has not time to carry out the best of surgical precautions, so the wound is better left open, plugged lightly with wool soaked in carbolic oil and dressed so for a few days.

In the first case operated on in this way the obstruction, a very large potato, was pushed up with a piece of strong wire which was forced into the potato through the wall of the œsophagus, but I found later that I could manage with my finger and so avoid any unnecessary injury.

Methods of Milking in Venezuela.

By E. MORGAN, F.R.C.V.S., D.V.H.,
Valencia, Venezuela.

“ Whene’er I take my walks abroad
What bally fools I see,
But such the justice of the Lord
They think the same of me.”

(With apologies to Mr. Robert Blatchford
and the Cambridge Don.)

WHEN one arrives for the first time in a foreign country and should he be interested in the handling of stock, he would probably observe that the methods are often quite distinct from those which he has been accustomed to deal with, and this might cause one of a critical trend of mind to express his opinion too freely, instead of reserving it until, in the majority of cases, he would be satisfied that there were good reasons for adopting such methods. Soon after my arrival in Venezuela I could not avoid thinking that the methods here of handling milch cows and their calves during milking time were something barbarous, and that there could hardly be any reasonable excuse to offer for such procedure, especially with cows which had previously been handled for several seasons.

Procedura.

In the majority of cases the cow is tied either by the horns or neck to a strong post in the yard, or, should the animal be a little more docile, a man holds the rope instead. Again, if the animal has been milked for one or more seasons, this rope is only held until the milker



gets the calf tied by means of a piece of rope around the neck to the foreleg of the cow. This is done after the calf has had time to taste its mother's milk and so stimulate the milking organs, the calf being the only one which has the desired effect, and naturally it must be the cow's own calf. The cows are brought into the yards in the late evenings from the fields, where, in the majority of cases, the calves are allowed to follow, but are kept apart during the night until the milking operation commences, when they are allowed out one by one by each milker and allowed to join their respective mothers. One might think that a cow, irrespective of breed, should yield her normal quantity of milk, whether the calf is present or absent, but such is not the case, so we have to admit here again that the old term "blood will tell" holds good, especially while observing the vast difference in temperament between the Venezuelan pure bred cow and the British cow, when both are being milked under the same conditions.

The Spanish breed of cattle, viz. cows and bulls, etc., are of a nervous disposition. This is rather a strange expression concerning a breed of cattle which can face jaguars, alligators and toreadors, and which will fight until they drop dead. Nevertheless they are nervous

cattle, and this accounts for the great care that is needed before even a limited quantity of milk is obtained from them. The normal quantity is about half a gallon per day (cows are only milked once a day in Venezuela). Should a calf die, as is often the case, then the owner must either abandon milking this particular cow until her next calving, or if the dead calf is found, its skin is removed and placed at milking time over another calf, as shepherds do with skins of dead lambs in order to deceive the mother. Naturally the shepherd does so in order to influence the ewe to adopt a motherless lamb, but here in the case of the calf it is done in order to get the cow to yield her milk, otherwise she is cast away for the season because she withholds her milk to such an extent that in most cases after a few weeks have elapsed, the quantity yielded is not worth the trouble and expense for milking, so it is futile to expect only a small percentage of the normal quantity unless the calf or its skin is present. The small quantity is obtained only with great trouble and difficulty, as the animal is all of a tremble unless the calf is alongside, thus the reason for tying the calf to the foreleg of the cow in order to calm her and to make her realise that the calf is near to take a share of the milk, as the custom is to leave one quarter with the milk undrawn and the calf is allowed to take this as soon as the other quarters are stripped by the milker.

During the last ten years we have imported British bred bulls in order to cross them with the pure native bred cows all of Spanish origin. From a dairying point of view the results have been most satisfactory, not only in the quantity of milk obtained, but also in the change from wild to docile animals. The half-bred cows, young and old, can be milked in the same manner as cows are milked in Great Britain, either loose in the yards or in stalls, and it is immaterial after the lapse of a day or two whether the calf is present or not, because the yield of milk remains normal. This is of great importance as it saves labour and the average yield of milk can be relied upon.

This subject is of great interest from a physiological point of view. It goes to prove that the milk yield depends to a great extent upon the nervous temperament of the cow. A milker here is considered a very poor hand unless he is able to sing while milking. This has been proved beyond doubt to have a great effect in calming the animal, so music hath charms to soothe even the wild cows of Venezuela in order to obtain more milk, but the effect of the music is the reverse with people who are anxious to have a quiet sleep sometime about 3 a.m., when about half a dozen cow-boys are singing at top-notes in the yards while milking the cows.

Maggocytic ! Surgery.

(AS APPLIED FOR REMOVING SMALL TUMOURS AND SITFASTS.)

By E. MORGAN, F.R.C.V.S., D.V.H.,

Venezuela.

"NECESSITY is the Mother of Invention." A few months ago during one of my travels in the interior of Venezuela, my saddle-horse got tired and I inquired at a certain ranch for another animal, so as to allow mine to rest until my return. The first horse offered me had a hard tumour or "sitfast," caused by a badly fitting saddle. This animal I refused to accept. On my return journey, after three weeks had elapsed, I called at the same place and asked to see the horse again, which was brought forward. To my surprise I found instead of the hard growth, a rather deep but even wound which resembled at first sight an ulcer, but on closer examination it proved to be a wound which was rapidly healing, with nothing further than the application once daily of neat creolin. Upon questioning the attendant, he explained that the tumour was removed in the usual way, which was as follows :---

Firstly the surface of the growth is scraped by a knife until a little blood appears. This is allowed to clot, so as to form a culture ground for eggs of the "blue-bottle" fly which can easily be found in a hot country on any animal with a slight wound or abrasion. These eggs are carefully lifted by means of a knife-blade and are placed on the abraded surface of the tumour where maggots soon hatch and feed and burrow deeper and deeper into the tumour and around its base until it gradually disappears leaving a cavity instead of a tumour. When it is considered that the maggots have consumed the whole growth, they are destroyed by means of pure creolin. As might be expected, the maggots do not confine themselves within the boundary line of the tumour, but gradually extend to the healthy tissue, but this is carefully watched by the attendant.

Since the above occurred I have made inquiries and find that it is quite a common method in the interior of this country to breed maggots on tumours in order to consume them.

A Peculiar Case in a Dog.

By FRANK CHAMBERS, O.B.E., F.R.C.V.S.,

Wolverhampton.

THE subject of this note is a Great Dane, male, aged 2½ years. I suspect that he has been castrated, for there is no evidence of testicles

but some remains of a scrotum. He is very docile and lazy with an inclination to put on fat. The left foot is deformed and almost club like, due to the fusion of the two middle toes.

In February, 1928, he had several interdigital cysts on the deformed foot, and during the winter months used to wear a specially made boot. If he went out into the snow without this boot a cyst usually followed. In December, 1928, he commenced to have epileptic fits and they came on every tenth day until the period lengthened out to 16 days. As the owner was at this time moving about, several practitioners saw and treated the dog without any apparent result. Luminal was not used, as far as I could determine. The owner returned home in June of this year, and the dog had several fits on June 17th. I prescribed luminal in gr. doses night and morning. On June 20th I gave a subcutaneous injection of artificial blood serum 300 cc., and left pot. brom. in gr. 20 doses to be given night and morning. On June 22nd another injection was given and a third one on the 25th with .5 cc. insulin. The pot. brom. was gradually reduced. He had another fit on July 18th, thirty-one days having elapsed since the last fit. This was the longest interval that he had had between fits since December 28th. I saw the dog on July 18th and gave chlorotone for a few days in conjunction with the pot. brom.

On July 23rd a subcutaneous injection of 300 cc. of artificial blood serum was given. A small abscess resulted from this last injection. The club foot has now become affected again, and to make matters worse, two cysts had made their appearance on the right foot. This was the first time that the right foot had been affected. Both feet were very painful. Poultices of cataplasma kaolin. co. were applied and from the cysts or abscesses small strings of tissue were obtained which resembled small nematodes. I examined some of these "worms" under the microscope, and came to the conclusion that these were not worms but strings of tissue. On August 5th I put the dog on to collosol manganese (oral). Shortly afterwards the dog accompanied his mistress to the seaside and whilst there had two fits, but they were very mild and of short duration. At this time he was not receiving any pot. brom. In September another fit (third one since June) took place exactly 30 days since the last one. The intramuscular injection of colossal manganese is now being tried to assist the foot lesions. They are certainly better and the dog walks with greater ease than he did.

The strange feature about this case is that before I saw the dog the owner states that when the fits were at their worst the foot was more or less normal, whereas when the cysts appeared no fits took place. As soon as a cyst burst and the pain went a fit would usually take place.

The dog has only had three fits since the bad one in June, that is after the subcutaneous injections of artificial blood serum were given, and those fits that have occurred have been very slight ones. This would seem to show that this line of treatment has been of benefit. The club foot has been bad most of the time and as it is now practically normal it will be interesting to see if the fits will recur. No bromide has been given for some time now.

Further Notes on the Prevention and Cure of Rickets in Monkeys.

By E. M. HUME, N. S. LUCAS and H. HENDERSON SMITH,

From the Department of Experimental Pathology,

Lister Institute, London.

IN 1927 the writers reported their success in the cure and prevention of rickets in monkeys by the use of ultra-violet light. Since that time considerably more experience has been gained, particularly as regards the prevention of rickets in monkeys, living as pets in the home and as regards the breeding of marmosets.

When rickets has already developed seriously in a pet monkey there is no doubt that irradiation with ultra-violet light is the easiest means of curing the condition; the writers have only seen one case which could not be cured by that means; the animal was a common marmoset, completely bed-ridden, with distended abdomen, deformed chest and bones bent in all directions. Other bad cases have been examined and it has sometimes been felt that it would really be better to kill the animal, which was obviously in much pain. In every case, however, excellent results have been obtained after a few weeks' treatment and even though much permanent deformity remained, the bones have hardened again and the animal has appeared fully able to enjoy life. It is indeed one of the most gratifying forms of cure that can be undertaken. Monkeys which have been cured in this way include a number of common marmosets, three Geoffroy's tamarins and a capuchin monkey. The cure was in every case effected with an exposure of from 10-20 minutes daily to a mercury vapour quartz lamp. Some of these monkeys on returning home received prophylactic treatment with a lamp; a small carbon arc, such as the Quain or Sunivray, which can be purchased for somewhere about £5, has been found satisfactory, and an exposure of 20 minutes daily is usually given. To many owners of monkeys, however, such a lamp represents too great an expense, and where this is the case the monkey can usually be kept in health by a daily oral administration of vitamin D, the bone-calcifying vitamin, in the form of Radiostol (prepared by the

British Drug Houses, obtainable at most chemists). This preparation is usually well taken but sometimes the animal has to be coaxed to take it and some monkeys absolutely refuse. Radiostol can be given as an oil ; about five drops daily on granulated sugar, or other favourite food, in a spoon, is usually well taken, or it can be bought as small sugar-coated pellets which some monkeys take more readily. It has proved effective in the case of several very young marmosets, kept as pets, for they have survived the winter, grown and thriven in a way they could never have done without it. Of course all owners of such pets have made every possible use of the summer sun in the open air, *through glass it is ineffective*, to reinforce the action of the Radiostol, but exposure to the sun should always be done judiciously, giving the animal the option of shade. A young woolly monkey was restored from a condition of helplessness to one of complete activity, by dietetic means alone, coupled with such sunshine as could be got on board the ship on which it chiefly lived. It received Radiostol, cod-liver oil and malt, beaten up raw egg and milk as sources of vitamin D.

Both Radiostol and ultra-violet light keep marmosets in such good condition that they are able to breed. The writers use ultra-violet light and have, at the time of writing, five English-bred marmosets, a male three years old, twin females a year old, and twin males six months old. No second generation has yet made its appearance but the females are only just adult. The three year old male has fathered young by a Brazilian female. Miss Ninette Austral, of Sidcup, has been successful in breeding marmosets by using Radiostol as the prophylactic means against rickets and she is the owner of male twins five months old. The charm of a marmoset family in which twins are the rule and triplets not infrequent, and in which the father takes his full part in carrying and minding the babies cannot be exaggerated. Breeding can be carried out in quite a small cage and presents no special difficulties if anti-rachitic prophylaxis is adequately carried out.

A species with which the writers have not heretofore been so successful is the squirrel monkey. The amount of irradiation with ultra-violet light which is sufficient for the marmoset is certainly not enough for them ; one squirrel monkey developed rickets in the writers' possession when receiving treatment similar to that given to the marmosets. It seems probable, however, that 30 minutes daily is a sufficient exposure for them, to the mercury vapour quartz lamp ; another squirrel monkey, a very young one, has grown and thriven admirably on that dose. In their dietary habits these animals differ greatly from marmosets, for they are passionately fond of newly born rats, eggs and chicken embryos, as well as all kinds of insects, which marmosets also like. Though not nocturnal themselves, like their relations the

Douroucolis, they belong to the group of night monkeys and may have been accustomed to rely on a diet of animal food as their source of supply of vitamin D, rather than on the rays of the sun. Investigation of each species will easily reveal what is the most suitable and most convenient form in which to administer anti-rachitic treatment, but that it should be adequately administered is a *sine qua non* of monkey keeping.

Reviews

Manual of External Parasites. By H. E. EWING. London. Baillière, Tindall & Cox. Price 20/- net.

This slender volume of 225 pages is written for the American market, but contains excellent keys for tracking down the world's genera of Mites, Ticks, Biting Lice, Sucking Lice and Fleas. The illustrations are good, photographs being supplemented by careful pen and ink drawings. *Sed beati divites!*

T. J. E.

Insects, Ticks, Mites and Venomous Animals of Medical and Veterinary Importance. PT. I, MEDICAL. By PATTON AND EVANS. The Liverpool School of Tropical Medicine. Price 20/-.

This is our old and valued friend Patton and Cragg metamorphosed into a class-book for students at the Liverpool School. The first six lessons form an excellent introduction to the study of Entomology by way of the Diptera, and one envies the student who is privileged to take the whole course. Its arrangement as a class-book in no way reduces the utility of this volume as a book of reference, or as a practical guide to the study of a particular entomological problem. Such misprints as *Ctenophthalmus* and *Nychiotherus* are editorial prerogatives, but *Anopleura* without apology leaves one scratching a bewildered head. The continuation of this fine book will be a welcome addition to veterinary literature.

T. J. E.

Laboratory Guide to Vertebrate Dissection for Students of Anatomy. By Dr. A. B. APPLETON, Lecturer in Anatomy at Cambridge. London. Cambridge University Press. Price 6/- net.

In order to derive full benefit from the course outlined in this book the student should, in addition to the usual elementary course of dissection of dogfish, frog and rabbit, have completed the professional study of the anatomy of man or horse. For such a student this book provides an evolutionary anatomical survey of the vertebrate series, with the author ever at his elbow asking the most apposite and searching questions. Anatomists of longer standing and writers of textbooks would do well to note and discuss with themselves the author's suggestions for the systematizing of the muddled nomenclature of vertebrate comparative anatomy.

T. J. E.

Personal University of London.

M.Sc. EXAMINATION FOR INTERNAL STUDENTS. VETERINARY SCIENCE. Congratulations to Mr. ARTHUR WALLACE STABLEFORTH, of the Research Institute, Royal Veterinary College, on his success in obtaining the M.Sc. of the University of London.

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